

CITY OF



**PUBLIC WORKS DEPARTMENT**

**EROSION CONTROL PLANS  
TECHNICAL GUIDANCE  
HANDBOOK**

**JANUARY, 1993**

**SECTION IV**

**EROSION CONTROL**

**TECHNICAL GUIDANCE HANDBOOK**

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# ORDINANCE

## (3-1993)

AN ORDINANCE ADOPTING EROSION CONTROL PLAN FOR THE CITY OF FAIRVIEW; SETTING FORTH RELEVANCY REQUIREMENTS FOR APPLICATION THEREOF; DESCRIBING REGULATIONS AND STANDARDS AND OTHER PERTINENT PROVISIONS FOR SOIL EROSION CONTROL; FEES AS REQUIRED AND PENALTIES FOR VIOLATION.

THE CITY OF FAIRVIEW ORDAINS AS FOLLOWS:

- 1.0 Whereas, each year tons of sediment are washed and blown from construction sites into local streams, rivers and lakes and is a major source of pollution to these water bodies and eroded materials clog streets, storm drains, culverts and stream channels causing private and public property damage. That the degradation of wildlife habitat and water quality and the burden placed upon the public and taxpayers for control and cleanup could be largely avoided through implementation of adequate erosion control practices; and
- 1.1 Whereas, this Council does hereby find after due review and investigation that the adoption of a soil erosion control plan for the City of Fairview would be in the public interest and the interest of all residents, inhabitants and property located within the City and should contain requirements for construction site erosion control which will involve and affect all construction activities, public and private, which involve the disturbance of land surfaces; and
- 1.2 Whereas, this Council has found that erosion control measures are required for construction areas where ground surfaces will be disturbed with clearing, grading, fills, excavations and other construction activities to avoid unnecessary soil erosion and damage to concerned properties; NOW, THEREFORE,
- 1.3 The City of Fairview does here ordain and adopt the following erosion control plan to promote and encourage construction practices which minimize the amount of disturbed land area and avoid or minimize work on steep slopes, the intent of which plan is to provide the following positive results:
- a. Less chance of soil washing off the site and clogging streets, drain systems, and neighbor's yards;
  - b. The number and size of erosion control measures required will be minimized;
  - c. The costs of maintaining erosion control facilities are minimized;
  - d. As much topsoil as possible is retained on concerned sites, making revegetation and landscaping easier to establish.

## 2.0 EROSION CONTROL PLAN SUBMITTAL REQUIREMENTS

Planning considerations and submittal requirements for erosion control plans for various types of construction projects are presented below. Full details of construction project erosion control requirements, submittal requirements, and review/enforcement procedures are available from the Public Works Department.

**Approval of a construction erosion control plan by the jurisdiction does not relieve the applicant's responsibility to ensure that erosion control measures are constructed and maintained to contain sediment on the construction site.**

### 2.1 Considerations in Planning for Erosion Control

Following are steps and check lists to use in the development and implementation of an acceptable erosion control plan. This information will provide the necessary tools to gain jurisdictional approval of construction activities for all types of construction sites and developments.

#### STEP 1: Identify Site Characteristics:

##### EXISTING:

- Topography/contours
- Existing drainage patterns and existing drainage systems on and immediately up and downstream of site.
- Site soils, as necessary
- Wetlands and sensitive areas, creeks, and other identified areas of concern

##### FUTURE:

- Future site contours
- Future site drainage system type and location
- Future impervious areas

#### STEP 2: Lay Out Preconstruction Plan and Proposed Base Measures:

- Determine construction timing and sequence
- Establish primary site access point(s) for construction traffic
- Lay out limits of clearing and construction activities
- Establish base protection measures including sediment barriers at toe of disturbed area and stabilized construction entrances
- Establish maintenance procedure for erosion control measures

**STEP 3: Measures During Construction:**

- Continue establishment of site interior base measures as site clearing and other site disturbances occur, including stockpile protection and sediment filters along slope contours
- Determine if construction may occur during wet season (November 1 through April 30)
- Establish and schedule wet weather measures including cover measures over exposed soils
- Establish maintenance procedures for erosion control measures

**STEP 4: Post Construction Measures:**

- Establish stabilized cover or other measure before removing base erosion control measures as approved by permitting agency

**2.2 Permit Application Requirements: Single-Family Homes and Duplexes on Existing Lots of Record**

Single-family home and duplex construction on existing lots of record and construction of additions to existing single-family homes and duplexes which will cause ground surface disturbance in excess of 500 square feet of area have the following requirements for construction period erosion control.

Erosion control methods are as designated in Table 3-1 in Chapter 3.

Submit with application for permit the following information:

- Completed Erosion Control Information form from Appendix B
- Construction schedule information, as required, including:
  - Construction start and completion dates,
  - Dates when erosion control measure will be in place,
  - Timing of site clearing and grading, fills placement, excavations,
  - Projected date of removal of erosion control measures (after landscaping is established or after establishment of a healthy grass stand or other vegetation).

The following may also be required:

- A site plan showing locations of the various required erosion control measures; or
- A typed sheet stating locations of the various required erosion control measures (can be submitted as part of the construction schedule, above).

## 2.3 Other Private Developments Construction

Construction on private property, other than those sites covered in Section 2.2 above, which will cause ground surface disturbance have the following requirements for erosion control.

Recommended erosion control measures are as designated in Tables 3-2 and 3-3 in Chapter 3.

Submit with construction plans for subdivision approval, grading, building, or erosion control permit the following information:

- Completed Erosion Control Information form from Appendix B
- Construction schedule with the following information:
  - Construction start and completion dates,
  - Dates when erosion control measure will be in place,
  - Timing of site clearing and grading, fills placement, excavations,
  - Projected date of removal of erosion control measures (after landscaping is established or after establishment of a healthy grass stand or other vegetation).

Submit also with construction plans:

- An erosion control plan drawing on a site plan showing:
  - Locations, types and applicable dimensions of erosion control measures,
  - Applicable details of erosion control measures showing full dimensions and construction information,
  - Existing and proposed ground contours,
  - Locations and sizes of existing and proposed drainage pipes and channels (labeled as such and with arrows indicating flow direction),
  - Site entrances/exits,
  - Applicable standard erosion control notes from Appendix D, with additions or changes as required,
  - Other notes including references to timing of placement and removal of erosion control measures, and erosion measure specifications such that types and quantities of materials necessary for the installation of the erosion control measures are fully detailed.

If the site erosion control plan includes sediment traps or ponds, the applicant shall also submit calculations used for determining trap or pond sizing.

Because of particular site conditions or preferences, the applicant may desire in certain cases to use different erosion control measures than are recommended in Tables 3-2 or 3-3. In such cases, the applicant must submit calculations or other supporting information used to determine the sizing and layout of the submitted erosion control plan.

Design criteria and use of the Soil Conservation Service Universal Soil Loss Equation for the purpose of sizing sediment traps or ponds, and proposed new erosion control measures are described in Appendix C.



#### 2.4 Private Construction in Public Rights-of-Way

Private construction in public rights-of-way has the same erosion control plan submittal requirements as noted in Section 2.3 above.

An exception is construction of private utilities and similar localized construction or maintenance activities. Such construction must meet noted erosion control measures in Table 3-3 for utilities construction and stock piles as applicable. For such construction, the applicant need only submit the Erosion Control Information form in Appendix B as required. If different erosion measures than indicated in Table 3-3 are desired, an erosion control site plan drawing must be submitted per Section 2.3 above.

#### 2.5 Public Works Construction

Public Works construction projects have the same erosion control plan design requirements as noted above for private construction in public rights-of-way. Erosion control plan submittal/review requirements will be the same as other types of developments in that they will be reviewed with the project drawing as a complete set.

### 3.0 EROSION CONTROL MEASURES

#### 3.1 Introduction and General Plan Requirements

Construction period erosion control measures are detailed in this chapter. The methods and measure outlined in this handbook are provided for use in the development of appropriate erosion control plan permit submittals as outlined in Chapter 2.

Erosion control measures are required during all construction and site disturbance activity and until permanent site ground covers are in place. As further detailed in Sections 3.2 and 3.3, certain base erosion control measures are required for construction sites at all times of the year. Also, additional cover or filtration measures are required during the wet weather season (November 1 through April 30).

Erosion control measures utilized for any construction site must be designed to achieve a disturbed area erosion loss of no more than 1 ton per acre per year, based on the Soil Conservation Service (SCS) Universal Soil Loss Equation. The erosion control measures outlined in the matrices in Section 3.2 are designed to achieve the 1 ton per acre per year goal, based on a typical soil type for the City of Fairview and East Multnomah County area. If, based on particular site conditions, different types or combinations of erosion control measures are desired for a construction site, the SCS Universal Soil Loss Equation or other approved supporting methodology/information must be used to design the erosion control system, and the design calculations must be submitted to the Engineering division with the proposed erosion control plan. A brief summary of the use of the Universal Soil Loss Equation is presented in Appendix C.

The designer should keep in mind when laying out an erosion control plan that the purpose of the plan is to minimize erosion and sedimentation from disturbed ground surfaces. Minimizing the area of clearing and grading, phasing of construction, and use of other methods to reduce the amount of land area disturbed will provide the greatest erosion control benefits.

The site owner/developer is responsible for seeing that erosion control measures are installed, maintained, and working as designed. An approved erosion control plan does not waive the owner/developer's responsibility for ensuring that erosion control is achieved. If an installed erosion control system does not adequately contain sediment on site, then the erosion measure must be field adjusted as necessary by the applicant, and as approved by the City of Fairview.

### 3.2 Erosion Control Matrices

Tables 3-1 through 3-3 are matrices presenting erosion control measures for various site and construction types.

Table 3-1 is a matrix summarizing erosion controls for single-family residential and duplex construction activities on single lots or record. Table 3-2 summarizes erosion control measures for larger construction sites including commercial, industrial, and subdivision development and construction. Table 3-3 is a matrix presenting erosion controls for small, linear utilities construction, and ditches/swales.

Erosion control measures are divided into two categories:

- Base measures which are required for construction sites at all times while there is disturbed, unstabilized ground surface on the site, and
- Supplementary wet weather measures which are required between November 1 and April 30 in addition to the base measures.

Base measures are indicated on Tables 3-1 through 3-3 with an "X" or an "A", "X" indicating primary base measures and "A" indicating alternate measures. The number in parenthesis after the "A" represents the base measure the alternate may replace. Wet weather measures are indicated on Tables 3-1 through 3-3 with an "\*" for primary measures and with an "O" for alternate measures.

Each erosion control measure presented in the matrices is presented in further detail with design, construction, and maintenance criteria in Section 3.3. Applicable subsections of Section 3.3 are referenced in parentheses after each erosion control measure presented in the matrices.

**TABLE 3-1 EROSION CONTROL MATRIX  
SINGLE-FAMILY/DUPLEX RESIDENTIAL**

	Single Family Slope < 2%	Duplex Res. Slope > 2%	Stock Piles
<b><u>BASE MEASURES</u></b>			
1. Gravel construction entrance (Sec. 3.3.1)			
2. Sediment fence/barrier @ toe of disturbed area or stock pile (Sec.3.3.2 & 3.3.3)		X	X
3. Sidewalk subgrade gravel barrier (site slopes to street @ <5% grade) (alternate to #2.) (Sec.3.3.4)		A(2.)	
4. Undisturbed buffer @ toe of disturbed areas (alternate to #2.) (site slopes <10%) (Sec.3.3.5)		A(2.)	
<b><u>WET WEATHER MEASURES:</u></b> Additional Requirements (select one Minimum)			
5. 6-mil plastic sheet cover (Sec. 3.3.9)			**
6. 2"-min. straw mulch cover (Sec. 3.3.7)			0
<b><u>POST CONSTRUCTION</u></b>			
7. Re-establish ground cover or landscape prior to removing erosion measures (Sec. 3.3.6)	X	X	

**KEY:** X = Base Measure

A = Alternate to Base Measure Indicated in Parenthesis

O = Alternate Wet Weather Measure to \*

\*\* = Supplemental wet weather measure (November 1 - April 30) required unless stockpiled material is contained on site which is protected by erosion control methods.

**NOTE:** If alternate number 3 (sidewalk gravel barrier is selected by contractor, the City reserves the right to require replacement of contaminated gravel prior to sidewalk construction.)

**TABLE 3-2 EROSION CONTROL MATRIX**  
**COMMERCIAL, SUBDIVISION & LARGE SITE CONSTRUCTION**

SITE SLOPE<sup>1</sup>

	<2%	<10%	<15%	<20%	<30%	<50%	>5000 00%	Stock Piles
<b>BASE MEASURES</b>								
1. Gravel construction entrance (Sec. 3.3.2)	X	X	X	X	X	X	X	
2. Sediment fence/barrier @ toe of disturbed area (Sec.3.3.2 & 3.3.3)		X	X	X	X	X	X	X
3. Undisturbed buffer @ toe of disturbed area (Sec. 3.3.5)		A(2.)						
4. Sediment fence installed on contours (spacing) (Sec.3.3.2)		X (300')	X (150')	X (100')	X (25')	X (25')	X (25')	
5. Temp. interceptor dikes/swales around active work areas (Sec.3.3.11)	#	#	#	#	#	#	#	
<b>WET WEATHER MEASURES; Additional requirements (select one minimum)</b>								
6. Established grass (Sec.3.3.6)		*	*	*	*	*		
7. 2"-min straw mulch' cover (Sec. 3.3.7)		0	0	0	0	0		0
8. Erosion blankets w/anchors (Sec. 3.3.8)		0	0	0	0	0	0	
9. 6-mil plastic sheet cover (Sec. 3.3.9)		0	0	0	0	0	*	**
10. Sediment trap or pond (Sec.3.3.10)		0	0	0	0	0		
<b>POST CONSTRUCTION</b>								
11. Re-estab. ground cover/land- scape prior to removing erosion measures (Sec. 3.3.6)	X	X	X	X	X	X	X	X

**KEY:** X = Base Measure

A = Alternate to Base Measure Indicated in Parenthesis

# = Optional Base Measure, Can Use as Applicable

\* = Recommended Supplemental Wet Weather Measure (November 1 - April 30)

0 = Alternate Wet Weather Measure to \*

\*\* = Supplemental wet weather measure (November 1 - April 30) required unless stockpiled material is contained on site which is protected by erosion control methods.

<sup>1</sup>NOTE: If different areas of the site have considerably different slopes, the site may be divided up and erosion measure(s) selected for each area from the appropriate column in the matrix.

**TABLE 3-3 EROSION CONTROL MATRIX**  
**UTILITIES CONSTRUCTION & STOCK PILES/DITCHES/SWALES PROTECTION**

	Utilities Construction		Stock Piles	Ditches/Swales
	Catch Basin Drainage	Ditch Drainage		(Construction & protection)
<b>BASE MEASURES</b>				
1. Sediment fence or barrier @ toe (Sec. 3.3.2 & 3.3.3)			X	
2. Check dams (Sec. 3.3.13 and 3.3.3)		X		X
3. Storm drain inlet protection barrier (Sec. 3.3.12)	X			
<b>WET WEATHER MEASURES</b>				
4. Established grass (Sec.3.3.6)				*
5. 6-mil plastic sheet cover (Sec. 3.3.9)			*	
6. 2"-min. straw mulch cover (Sec. 3.3.7)			0	0
7. Erosion blanket w/anchors (Sec. 3.3.8)				0
<b>POST CONSTRUCTION</b>				
8. Re-establish ground cover or landscape prior to removing erosion measures (Sec.3.3.6)	X	X		X

**KEY:** X = Base Measure  
 \* = Supplemental Wet Weather Measure (November 1 - April 30)  
 0 = Alternate Wet Weather Measure to \*

### 3.3 Design Criteria

The following sections provide design, construction, and maintenance criteria and recommendations for the erosion control measures listed in the matrices in Section 3.2.

#### 3.3.1 Gravel Construction Entrances

##### Purpose

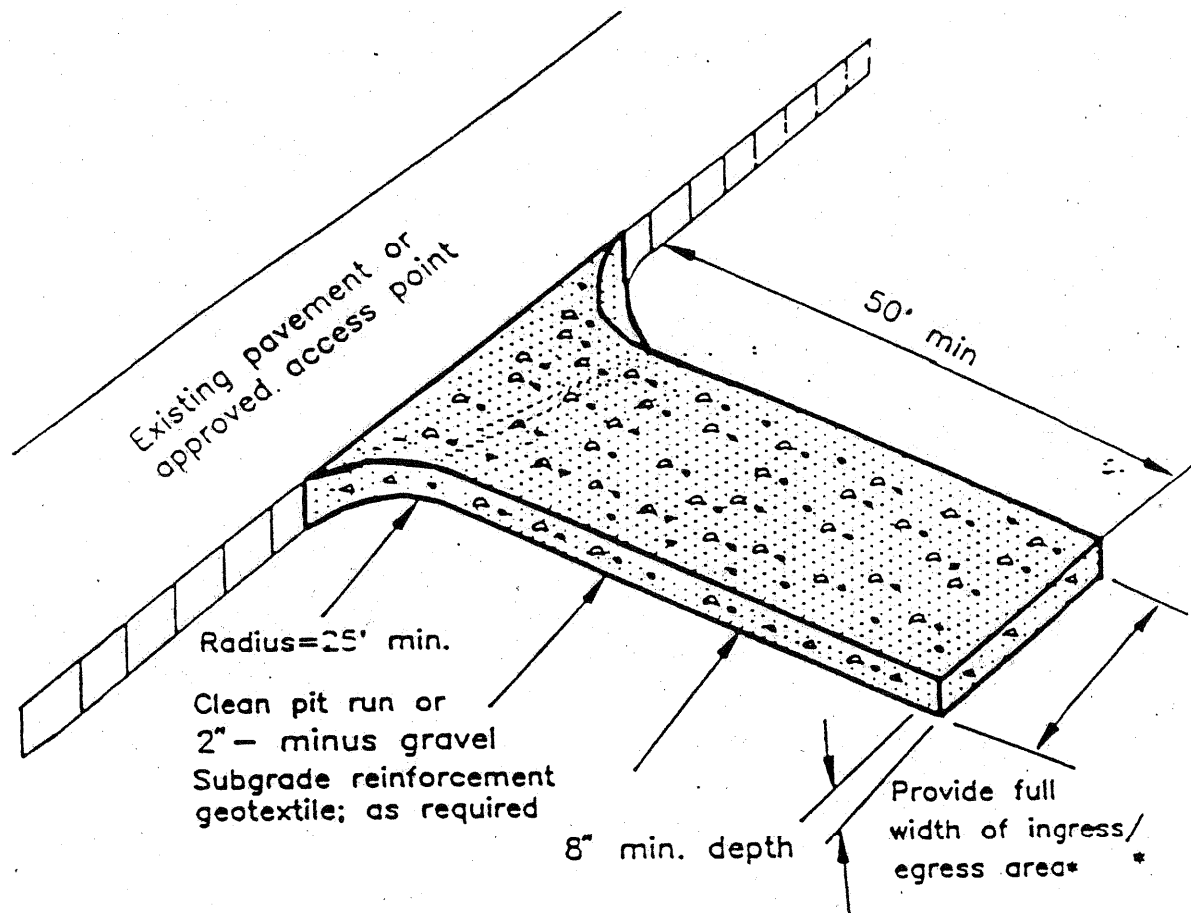
To reduce the amount of mud, dirt, rocks, etc., transported onto roads by motor vehicles or storm water run-off by constructing a stabilized pad of gravel at entrances/exits to construction sites.

##### Conditions Where Practice Applies

At any construction site where traffic will be leaving the site and moving directly onto public roads, other paved areas, or other approved access points.

##### Design Criteria/Specifications

- See Figure 3-1A for details.
- Material should be clean pit run or 3/4"-minus gravel (or larger, as needed).
- The gravel pad shall be at least 8 inches thick and 50 feet in length. Width shall be the full width of the vehicle ingress and egress area. A 20-foot minimum pad length may be acceptable as approved for single-family and duplex residential construction sites.)
- Use subgrade reinforcement geotextile under gravel pads for all but construction of a single-family/duplex residence on existing lots of record.
- Additional gravel may have to be added periodically to maintain proper function of the pad.
- Additional Measures. If the gravel pad does not adequately remove dirt and mud from vehicle wheels such that mud and dirt tracking is evident off site, additional measures must be taken. Such measures may include washing off wheels before vehicles leave the site or other construction techniques/work operations modifications.



\* 20' min. for single family & duplex residential

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				DWG No. 3-1A

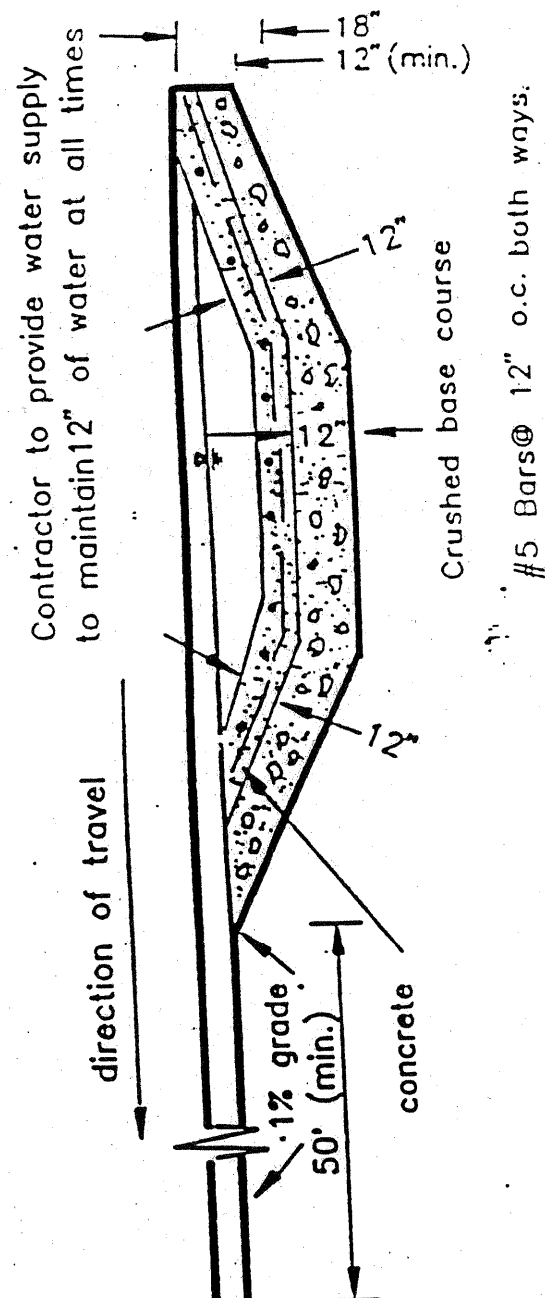
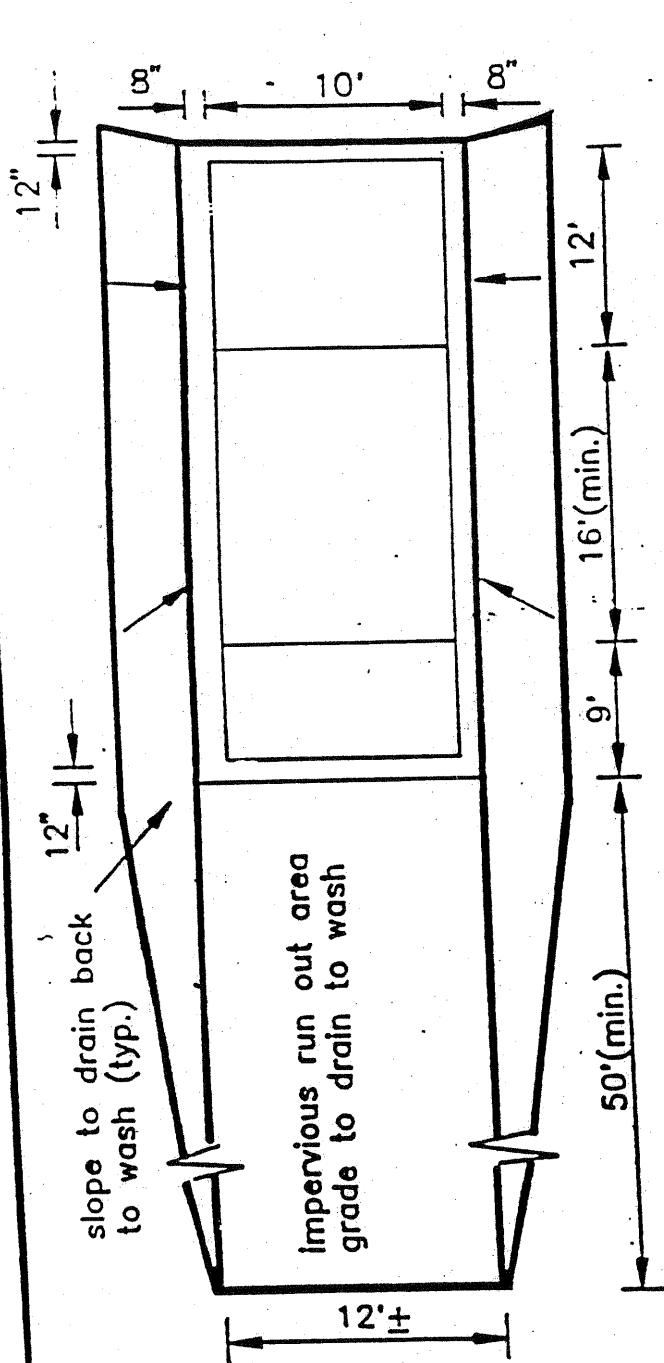


Wheel washing should be done on the gravel pad or in an approved wheel wash structure located on-site, adjacent to and on the site interior side of the gravel pad. Wash water shall be drained through a silt-trapping structure prior to leaving the construction site. See Figure 3-1B for details of a typical wheel wash structure.

Another additional measure is to construct gravel filter berms across on-site traffic wheel paths to capture and retain sediment. Berms shall be 1 foot high with 3:1 side slopes, construction of 3/4 to 3-inch well-graded or crushed rock with less than 5 percent fines. Berms must be inspected regularly and accumulated sediment removed and rock added or replaced as needed. Berms should be spaced as follows:

- every 300 feet on slopes less than 5 percent
- every 200 feet on slopes between 5 and 10 percent,
- every 100 feet on slopes greater than 10 percent.

All gravels or soils which are carried, tracked, or otherwise moved from the original location onto the paved surface will be immediately cleaned up and mechanically removed from the paved surface. The washing of any paved surfaces will not be allowed until after the surface has been swept clean of all soils.



#### Notes

Contractor to remove accumulated sediment from wheel wash; may be piped to an approved sediment trap

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Rev.	Date	Appr.	WHEEL WASH	Appr:
				DWG No. 3-1B

### 3.3.2 Temporary Sediment Fences

#### Purpose

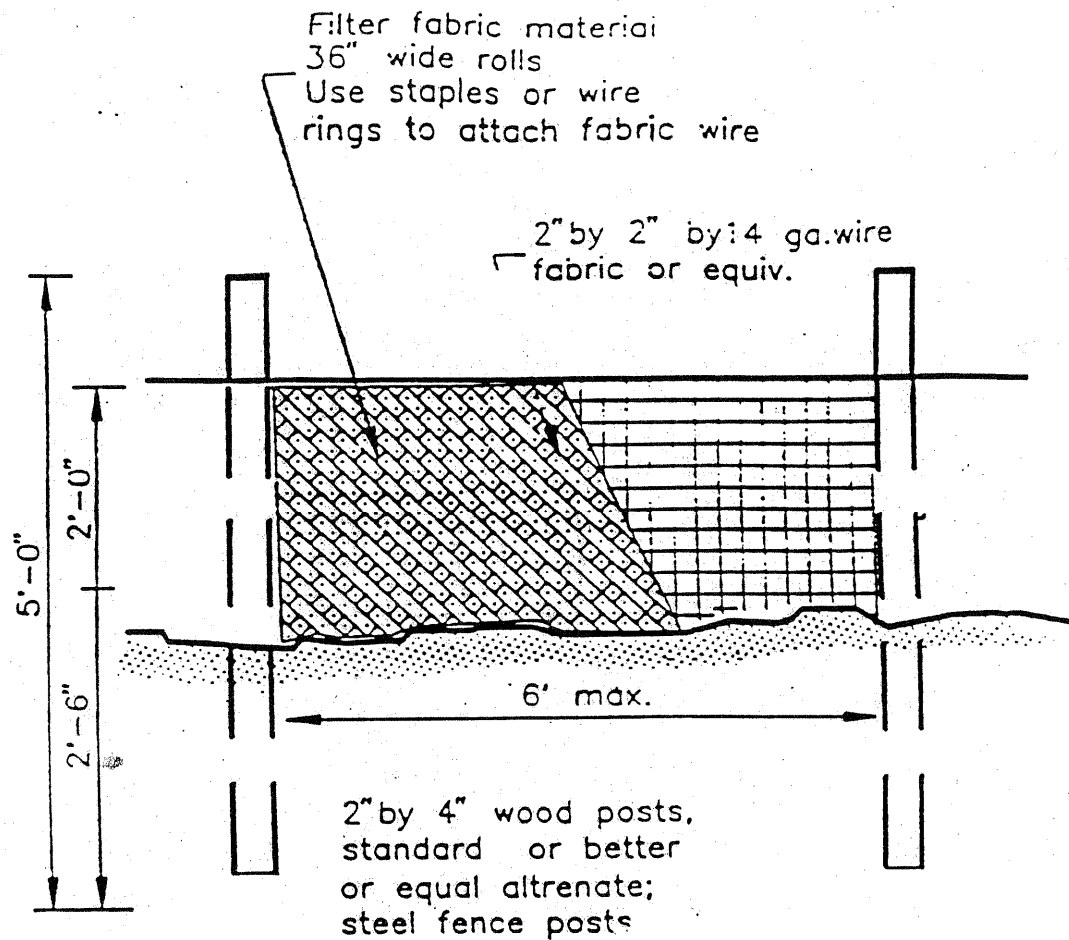
To reduce the transport of sediment from a construction site by providing a temporary physical barrier to sediment and reducing run-off velocities.

#### Conditions Where Practice Applies

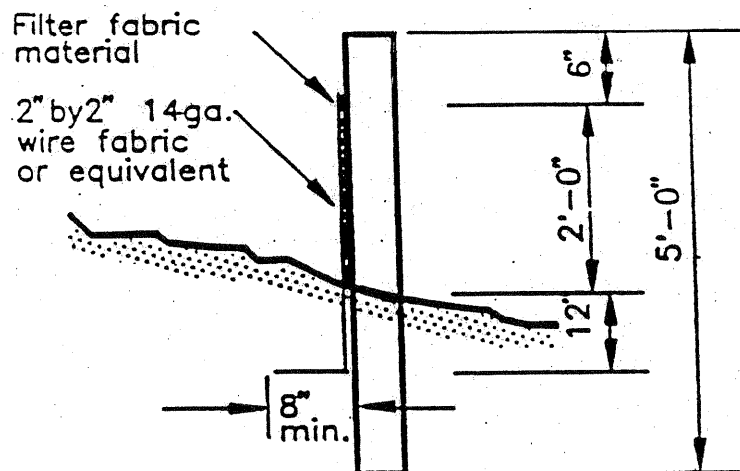
- Down slope of disturbed areas where run-off occurs as sheet run-off.
- At the toe of soil stock piles.
- At intervals as indicated on Table 3-2 along the contours of large disturbed areas.
- At grade breaks exceeding 20%.
- Following discharge from a sediment trap or pond.
- Sediment fences shall not be installed across streams.

#### Design Criteria/Specifications

- See Figure 3-2 for details.
- Maximum sheet or overland flow path length to sediment fence is per Table 3-2.
- Selection of filter fabric tensile and bursting strength characteristics depends on the support fence. Fabric attached to chain-link fence need not possess the same strength as one attached to a fence of 6- by 6-inch reinforcing wire or one attached only to posts. Selection is thus based on standard engineering principles. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0°F to 120°F.
- Unless otherwise waived by the jurisdiction, when standard strength filter fabric is used, a wire support fence shall be fastened securely to the upslope side of the posts using heavy-duty wire staples at least 1 inch long, tie wire, or hog rings. The wire shall extend into the trench a minimum of 4 inches and shall not extend more than 36 inches above the original ground surface.



Notes:  
Bury bottom of  
filter material in  
8" by 12" trench



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				DWG No. 3-2

- When extra-strength filter fabric and closer post spacing are used, the wire mesh support fence may be eliminated. In such a case, the filter fabric is stapled or wired directly to the posts with all other provisions of the above standard note for standard strength filter fabric applying.
- All materials to be in good physical condition to provide proper sediment retention.
- Where practical, the filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid use of joints. When joints are necessary, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and both ends securely fastened to the post.
- Sediment fences shall be inspected by applicant/contractor immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.
- At no time shall more than one foot depth of sediment be allowed to accumulate behind a sediment fence. Sediment should be removed or regraded into slopes, and the sediment fences repaired and re-established as needed.

### 3.3.3 Straw Bale Sediment Barrier

#### Purpose

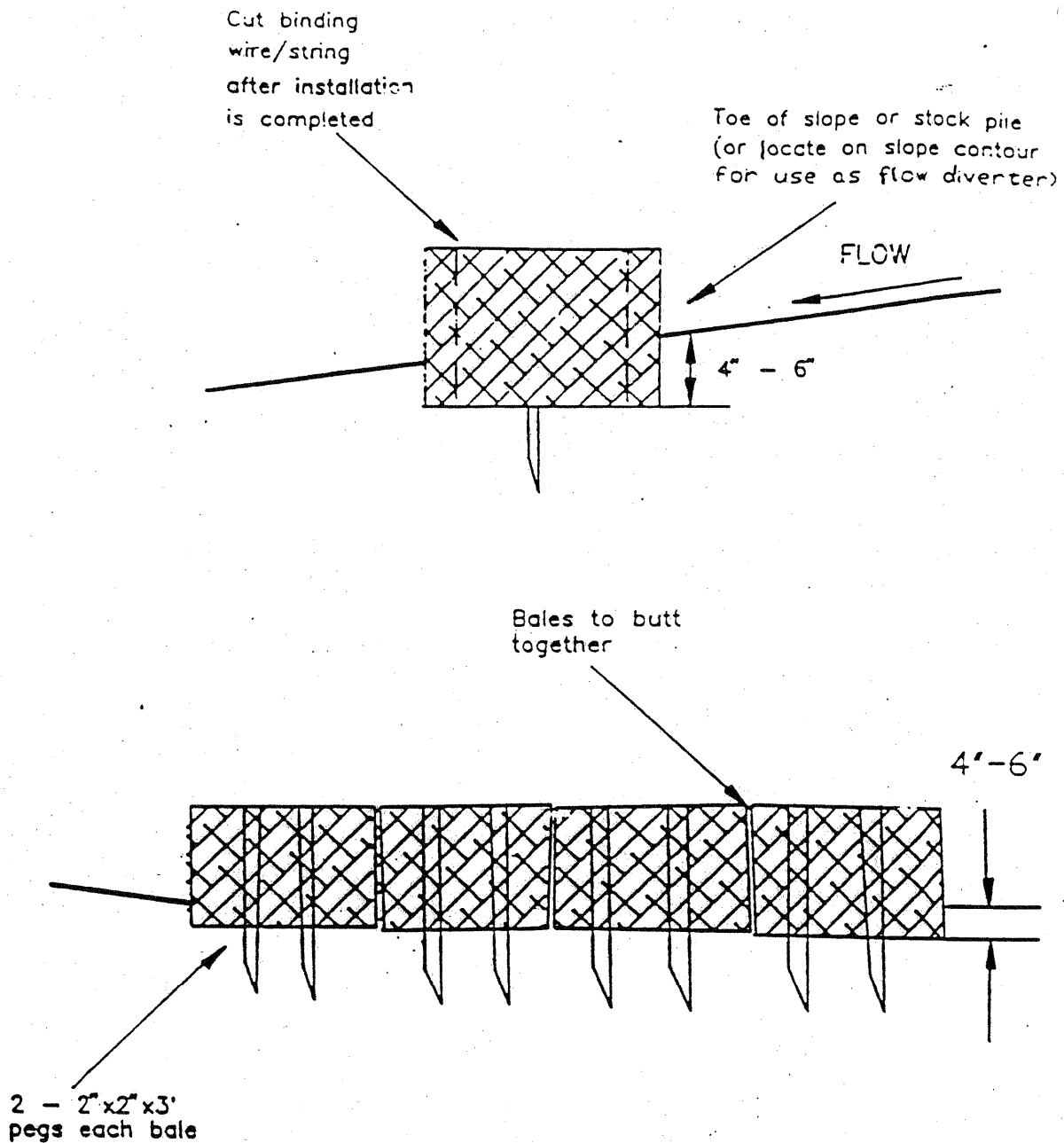
To reduce the transport of sediment from a construction site by providing a temporary physical barrier to sediment and reducing run-off velocities. Also may be used to divert run-off around active work areas or into sediment filtration/sedimentation areas.

#### Conditions Where Practice Applies

- At toe of soils stock piles.
- In existing, undisturbed drainage ditches/swales used to convey drainage through disturbed areas of construction site (as allowed by the jurisdiction). Note: See Section 3.3.13 "Check Dams" for use of straw bales and other methods to protect new and disturbed swales and ditches.
- Note: See Section 3.3.11 "Temporary Interceptor Dikes and Swales" for use of straw bales as flow interceptor dikes.
- Straw bales do not work as filters but are effective when used to block, slow or divert flows.

#### Design Criteria/Specifications

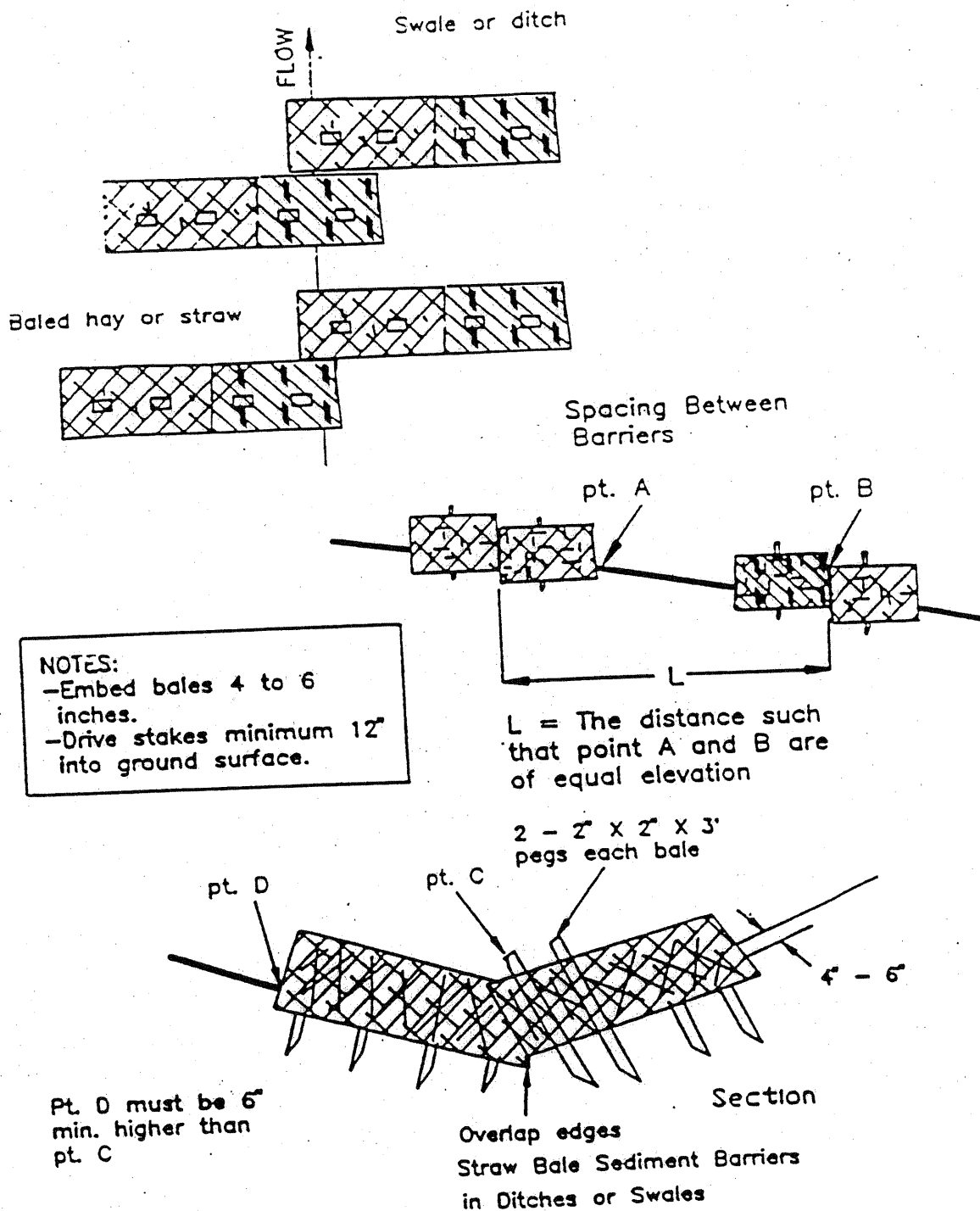
- See Figures 3-3A and 3-3B for details of straw bale sediment barriers.
- Straw bales shall be standard 40 to 60 pound rectangular bales of cereal grain or seed straw.
- Stakes shall be wood of size as shown on Figures 3-3A & B and driven through bales and into ground to a minimum depth of 12 inches.
- Straw bales shall be keyed into existing ground 4 to 6 inches.
- Straw Bale Sediment Barriers may be left in place or used as mulch after completion of site work if approved by the jurisdiction.
- At no time shall more than a one foot depth of sediment be allowed to accumulate behind straw bale sediment barriers. Sediment should be removed or regraded into the slope, or new lines of barriers installed uphill of sediment-laden barriers.



**NOTES:**

- \* Embed bales 4 to 6 inches
- \* Drive stakes minimum 12" into ground surface.
- \* Drive stakes flush to top of bales

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				DWG No. 3-3A



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Engr.				Date:
Rev.	Date	Appr.	STRAW BALE SEDIMENT BARRIER	Appr:
				DWG No. 3-3B



### 3.3.4 Sidewalk Subgrade Gravel Barrier

#### Purpose

To reduce the transport of sediment from a construction site by using the sidewalk subgrade gravel as a temporary filter for sediment-laden run-off.

#### Conditions Where Practice Applies

Single-family/duplex residential construction sites, where the site slopes to a street with planned but unconstructed sidewalks, and site slopes are less than 5 percent.

#### Design Criteria/Specifications

- Sidewalk subgrade gravel must be in place during the entire construction period, from the time of initial site clearing/grading through establishment of permanent site cover. If the sidewalk concrete is to be poured prior to the establishment of permanent site cover, approved sediment barriers must be installed prior to pouring concrete.
- Sidewalk subgrade gravel must have a minimum 4-inch depth and a 5-foot width.
- If the sidewalk subgrade gravel does not provide an effective filter such that sediment is leaving the construction site, additional measures must be applied. These may include replacement of gravel or installation of sediment barriers.
- Subgrade gravel may not meet the specifications for sidewalk concrete placement if too much sediment has infiltrated the rock. The permittee must therefore weigh the benefits of eliminating sediment barriers versus the possibility that the subgrade gravel may be rejected by the inspector.

### Undisturbed Buffers

#### Purpose

To provide a natural vegetated buffer area for filtering erosion from construction areas, as an alternate in certain cases, or supplemental measure to sediment barriers.

#### Conditions Where Practice Applies

An undisturbed buffer may be used as approved as an alternate to a sediment barrier at the toe of the site slopes if the buffer meets the following criteria:

- The buffer is an undisturbed grassy area or covered with other approved dense vegetation,
- The buffer is downhill and in the drainage path of the construction/disturbed area,
- There are no concentrated flows from the disturbed site entering the buffer,
- The buffer area is owned by the applicant or approved for such use in writing by the owner,
- Slopes in the buffer and its drainage area are less than 10 percent,
- The grassed buffer area impacted by the potential disturbed area run-off is at least equal in area to the uphill construction/disturbed area draining to it.

### 3.3.6

#### Establishing Temporary Grasses and Permanent Vegetative Cover

##### Purpose

To reduce erosion and sedimentation by stabilizing exposed soils with vegetation and mulching.

##### Conditions Where Practice Applies

- Ground surfaces exposed during the wet season (November 1 through April 30).
- Areas which will not be subjected to heavy wear by on-going construction traffic.
- Exposed ground surfaces at end of construction period (permanent cover must be established prior to removal of any erosion control measures).
- Temporary or permanent stabilization of new or disturbed ditches or swales.

##### Design Criteria/Specifications: Temporary Erosion Control Grasses

- Temporary grass cover measures must be fully established by November 1 or other cover measures will have to be implemented until adequate grass coverage is achieved. To establish an adequate grass stand for controlling erosion by November 1, it is recommended that seeding and mulching occur by October 1.
- Hydromulch shall be applied with grass seed at a rate of 2000 lb./acre. On slopes steeper than 10%, hydroseed and mulch shall be applied with a bonding agent (tackifier). Application rate and methodology to be per seed supplier recommendations.
- Dry, loose, weed-free straw used as mulch shall be applied at double the hydromulch application requirement (4000 lb./acre). Anchor straw by working in by hand or with equipment (rollers, cleat tracts, etc.).
- Mulch shall be spread uniformly immediately following seeding.
- Soil preparation - top soil should be prepared according to landscape plans, if available, or recommendations of grass seed supplier. It is recommended that slopes be roughened before seeding by "track-walking", (driving a crawling tractor up and down slopes to leave a pattern of cleat imprints parallel to slope contours) or other method to provide more stable sites for seeds to rest.

- Seeding - Recommended erosion control grass seed mixes are as follows. Similar mixes designed to achieve erosion control may be substituted if approved by the City.

1. Dwarf Grass Mix (low height, low maintenance)  
Dwarf Perennial Ryegrass, 80% by weight  
Creeping Red Fescue, 20% by weight application rate: 100 pounds minimum per acre

2. Standard Height Grass Mix  
Annual Ryegrass, 40% by weight  
Turf-type Fescue, 60% by weight  
Application rate: 100 pounds minimum per acre

- Fertilization for grass seed - as per supplier's recommendations. Development areas within 50 feet of water bodies and wetlands must use a non-phosphorus fertilizer.
- Netting and anchors, as needed - for disturbed areas on slopes and in ditches/swales, biodegradable netting or jute is desirable and may be used instead of bonding agents to provide a stable area for seeding. Netting should be anchored per manufacturer's recommendations.
- Watering - seeding shall be supplied with adequate moisture to establish grass. Supply water as needed, especially in abnormally hot or dry weather or on adverse sites. Water application rates should be controlled to provide adequate moisture without causing run-off.
- Re-seeding - areas which fail to establish grass cover adequate to prevent erosion shall be re-seeded as soon as such areas are identified, and all appropriate measures taken to establish adequate cover.

Design Criteria/Specifications: Permanent Vegetative Groundcover

- At the end of site construction, paving, approved permanent site landscaping or establishment of a healthy stand of grass (or alternative vegetation as approved) must occur prior to removal of site erosion control measures.

### 3.3.7 Straw Mulch

#### Purpose

To reduce erosion by providing a protective cover over disturbed bare or reseeded soils. Also can be used to enhance success of seeding/revegetation.

#### Conditions Where Practice Applies

- As cover on ground surfaces and stockpiles exposed during the wet season (November 1 through April 30).
- As a mulch to enhance vegetation establishment in areas that have been seeded.

#### Design Criteria/Specifications

- Loose, weed-free straw mulch shall be applied at a rate of no less than 4000 pounds (2 tons) per acre, and shall have a minimum depth in-place of 2 inches.
- Mulch must be stabilized in place by hand or machine punching the straw into the soil, spraying it with tacking agent, or covering it with an erosion blanket. See Section 3.3.8 "Erosion Blankets" for appropriate design criteria for such coverings.

### 3.3.8 Erosion Blankets

#### Purpose

To provide immediate protection and physical stabilization of disturbed soils. Typically used when vegetative cover cannot be achieved due to soils, slopes, or time of year. Can be used to enhance success of seeding, planting, and/or sodding.

#### Conditions Where Practice Applies

- On areas of steep slopes (greater than 50%) and areas of moderate slopes that are prone to erosion.
- As a cover on ground surfaces exposed during the wet season (November 1 through April 30).
- As supplemental aid to seed and/or mulch treatment on slopes or in ditches or swales.

#### Design Criteria/Specifications

- Erosion blankets may be used on level areas and on slopes up to 1:1c. Where soil is highly erodible, netting shall only be used in conjunction with an organic mulch such as straw or wood fiber. The blanket must be applied so that it is in complete contact with the soil; if it is not, erosion will occur beneath it. Erosion blankets shall be securely anchored to the slope per manufacturer's recommendations.
- Deformed plastic filament matting such as Enkamat (and other erosion control blankets as approved) may be used for stream velocity protection and other special applications when approved by the City.

### 3.3.9 Plastic Sheet Covering

#### Purpose

To provide immediate erosion protection to slopes and disturbed areas when vegetative cover cannot be achieved due to soils, slopes, or time of year. To provide erosion protection on soils, spoils, and other erodible stockpiles.

#### Conditions Where Practice Applies

- Disturbed areas which require immediate erosion protection.
- On areas of steep slopes (greater than 50%) and areas of moderate slopes that are prone to erosion.
- On ground surfaces and stockpiles exposed during wet weather season (November 1 through April 30).
- As a temporary measure to provide erosion protection and assist in germination on areas seeded between November 1 and March 31.

#### Design Criteria/Specifications

- Plastic sheeting shall be polyethylene and have a minimum thickness of 6 mil.
- Covering shall be installed and maintained tightly in place by using sandbags or tires on ropes with a maximum 10 foot grid spacing in all directions. All seams shall be taped or weighted down full length and there shall be at least a 12-inch overlap of all seams. For seams parallel to the slope contour, the uphill sheet shall overlap the downhill sheet. No run-off shall be allowed to run under the plastic covering.
- Drainage from areas covered by plastic sheeting shall be controlled such that no discharge occurs directly onto uncontrolled, disturbed areas of the construction site.
- Clear plastic sheeting may be installed on areas seeded between November 1 to March 31 to provide a greenhouse-type of environment, and remain until vegetation is firmly established.

### 3.3.10 Sediment Traps and Ponds

#### Purpose

To collect and store sediment eroded from exposed ground surfaces, disturbed during the construction period, prior to establishment of permanent vegetation and drainage facilities.

#### Conditions Where Practice Applies

- Downhill of areas with exposed soils during the wet season (November 1 through April 30).
- Sediment Traps: Where the tributary drainage area is 3 acres or less (but not including single family and duplex residences constructed singly, on existing lots of record), and slopes are less than 50%.
- Sediment Ponds: Where the tributary drainage area is 10 acres or less and slopes are less than 50%.

#### Design Criteria/Specifications

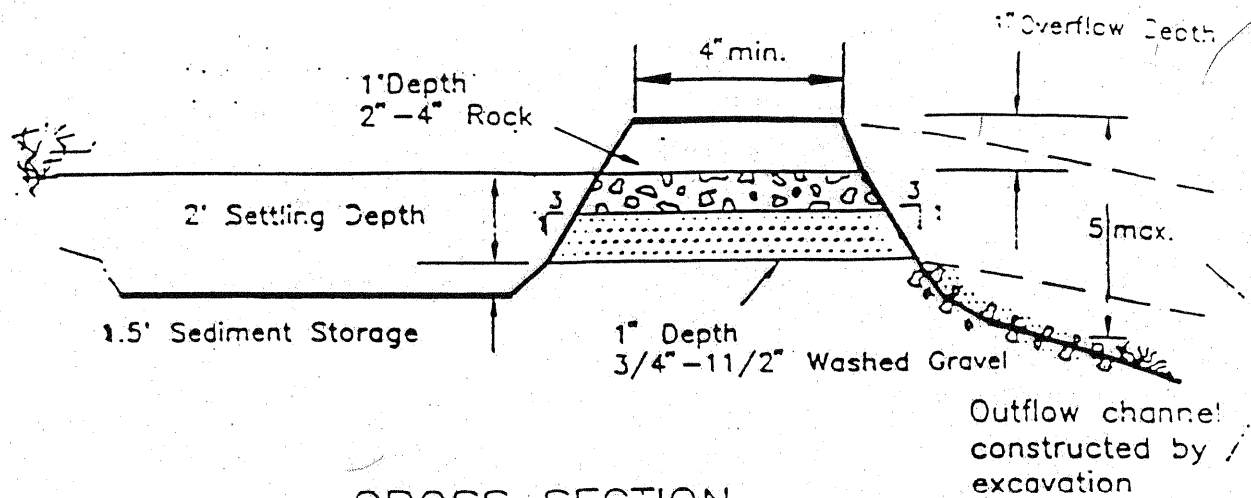
- Temporary interceptor dikes or swales may be constructed to divert run-off to sediment traps or ponds.

#### A. Sediment Traps

The sediment trap may be formed completely by excavation or by construction of a compacted embankment. It shall have a sediment storage depth not to exceed 1.5 feet, topped by a 2 foot deep settlement zone. Sediment trap side slopes shall be 3:1 or flatter. The outlet of the trap should be a weir/spillway, providing a minimum 1 foot overflow depth between the spillway and embankment. A filter fabric fence or similar filter must be constructed to filter run-off from the trap prior to discharge from the construction site.

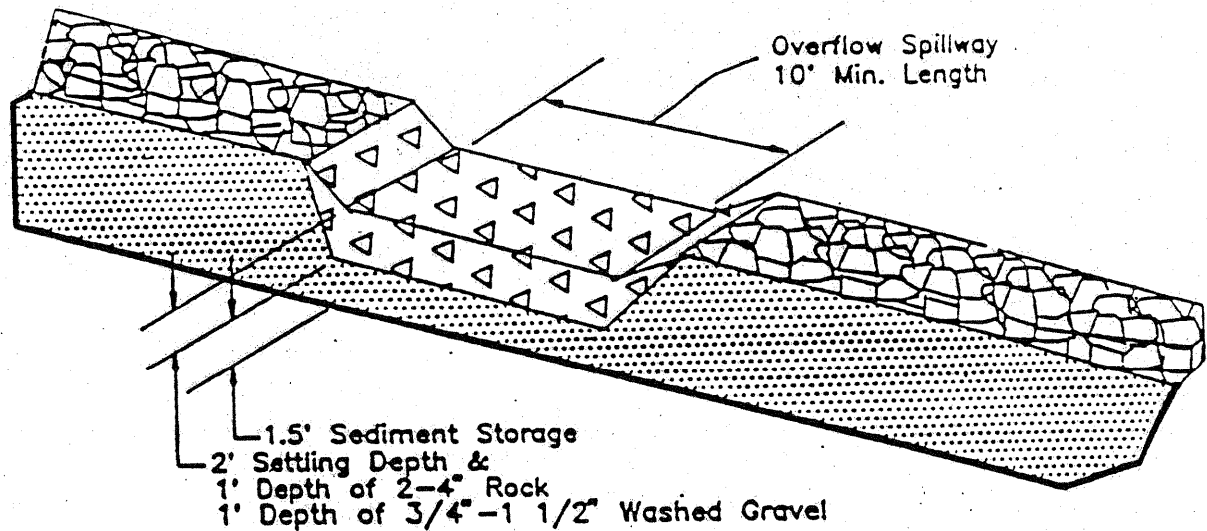
- See Figure 3-4 for details
- Calculate the required sediment storage volume using the SCS Universal Soil Loss Equation as described in Appendix C and assuming minimum one year sediment accumulation period for design purposes. To convert tons of sediment as calculated to cubic feet, ~~multiply~~ <sup>divide</sup> by 0.05 tons per cubic foot.





## CROSS SECTION

NOTE: May be constructed by excavation or by building a berm.



## SEDIMENT TRAP OUTLET

### Note:

A filter fabric fence or similar filter must be constructed to filter runoff from the sediment trap prior to discharge from the const. site.

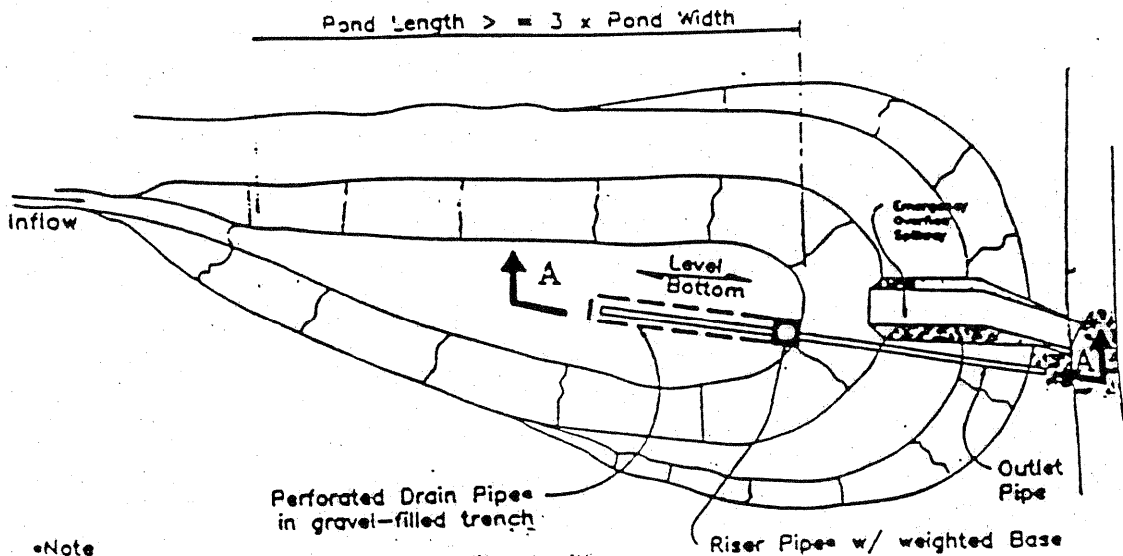
Drawn M.R.M.			PUBLIC WORKS DEPARTMENT CITY OF FAIRVIEW	Scale: R.S.
Engr.				Date:
Rev.	Date	Appr.	SEDIMENT TRAP	Appr:
				DWG No. 3-4

- Determine the bottom surface area of the sediment trap using the calculated sediment volume and the maximum 1.5 foot depth and 3:1 side slope requirements.
- Determine the total trap dimensions by adding an additional 2 feet of depth for settling volume (before overtopping of spillway) above the sediment storage volume, while not exceeding 3:1 side slopes.
- A 3:1 ratio of trap length to width is desirable. Length is defined as the average distance from the inlet to the outlet of the trap.

#### B. Sediment Ponds

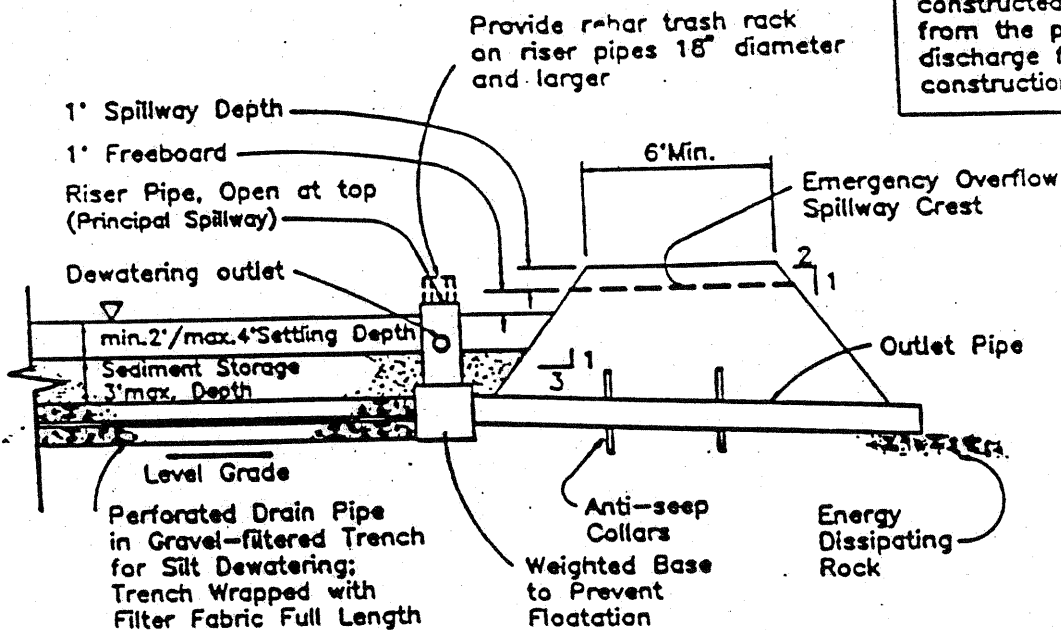
A sediment pond may be formed by partial excavation and/or by construction of a compacted embankment. It may have one or more inflow points carrying polluted run-off. Baffles to spread the flow throughout the pond should be included. A securely anchored riser pipe is the recommended principal discharge mechanism, with an emergency overflow spillway. The riser pipe should be perforated and covered with filter fabric and gravel "cone" for filtration; or solid with a 1" diameter dewatering hole and perforated drain pipe. Outlet protection shall be provided to reduce erosion at the pipe outlet. A filter fabric fence or similar filter must be constructed to filter run-off from the pond prior to discharge from the construction site.

- The sediment pond shall have a sediment storage depth no greater than 3 feet, topped by a 2-foot (minimum) to 4-foot (maximum) deep settlement zone and an additional 1-foot minimum of freeboard. The pond side slopes shall be 3:1 or flatter.
- See Figure 3-5 for details.
- The sediment storage volume is determined in the same manner as mentioned above for sediment traps.
- The pond riser pipe and outlet pipe shall be sized to carry the 10-year design storm (or as otherwise required by the jurisdiction).
- A 3:1 ratio between the pond length and width is desirable. Length is defined as the average distance from the inlet to the outlet of the trap. Use baffles in the pond to help prevent short-circuiting and to increase the effective pond length where site conditions prohibit constructing a pond with a 3:1 length to width ratio.



\*Note  
Sediment dewatering may be accomplished with perforated drain pipe in trench as shown or with a perforated riser covered with filter fabric and gravel "cone".

Note: A filter fabric fence or similar filter must be constructed to filter runoff from the pond prior to discharge from the construction site.



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### 3.3.11 Temporary Interceptor Dikes and Swales

#### Purpose

To intercept storm run-off from drainage areas above unprotected slopes and direct to a stabilize outlet. To intercept storm run-off from a disturbed site and direct it to a sediment trap or pond.

#### Conditions Where Practice Applies

- Where the volume and velocity of run-off from disturbed slopes must be reduced. When an interceptor dike or swale is laced above a disturbed slope, it reduces the volume of water reaching the disturbed area by intercepting run-off from above.
- Where sediment traps or ponds are to be used. Interceptor dikes and swales can be used to direct site run-off to a sediment trap or pond.

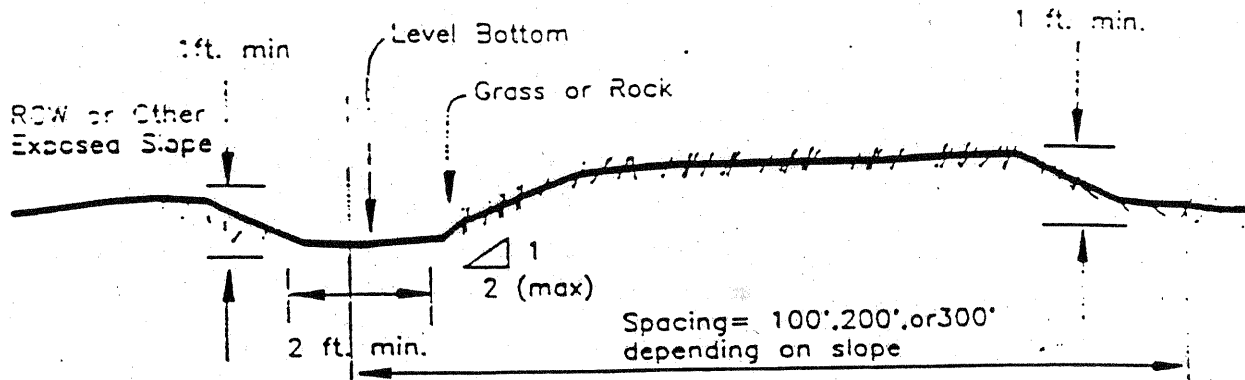
#### Design Criteria/Specifications

- Intercepted run-off must be directed to a stabilized area such that no erosion occurs due to the additional water and velocity, or to a sediment pond or trap.
- See Figure 3-6 for details. Straw Bales may also be used to intercept run-off. See Section 3.3.3 "Straw Bale Sediment Barrier" for installation criteria and specifications.
- Interceptor dikes and swales shall be stabilized with approved cover before put into use. Such cover may include grass, rock, or erosion blankets.
- Spacing between interceptor dikes and swales along slope contours is as follows:

<u>Slope</u>	<u>Spacing</u>
<5%	300 feet
5-10%	200 feet
10-40%	100 feet

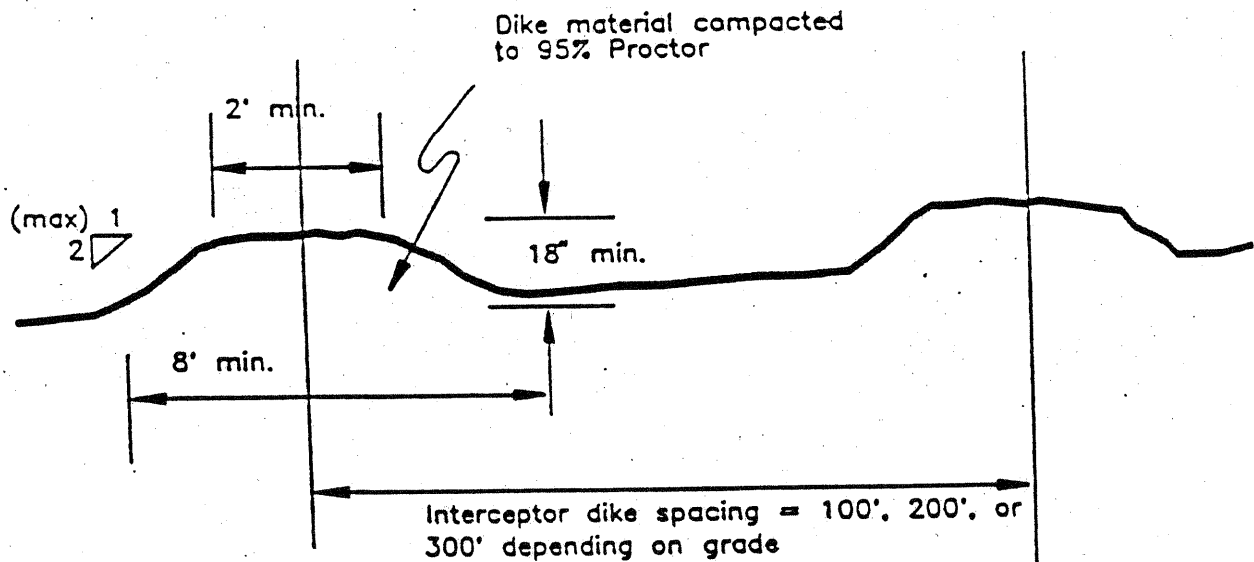
- Minimize construction traffic over dikes and swales.
- The upslope side of interceptor dikes shall provide positive drainage to the dike outlet. Provide energy dissipation measures as necessary to minimize erosion at dike outlet.

## INTERCEPTOR SWALE



Bottom Width	2 feet minimum; the bottom width shall be level
Depth	1 foot minimum
Side Slope	2H:1V or flatter
Grade	Maximum 5 percent, with positive drainage to a suitable outlet (such as sedimentation pond)

## TEMPORARY INTERCEPTOR DIKES



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				DWG No. 3-6

- Grades for drainage parallel to interceptor dikes shall be between 0.5 and 1.0 percent.
- Maximum grade of interceptor swales shall be 5 percent, and provide positive drainage to outlet.
- Outlets shall lead to sediment trap/pond when run-off from disturbed areas is intercepted by dikes/swales. Outlets shall be stabilized to prevent erosion.
- Temporary dikes and swales shall be graded out at the completion of construction, when permanent vegetation has been established.

### 3.3.12 Storm Drain Inlet Protection

#### Purpose

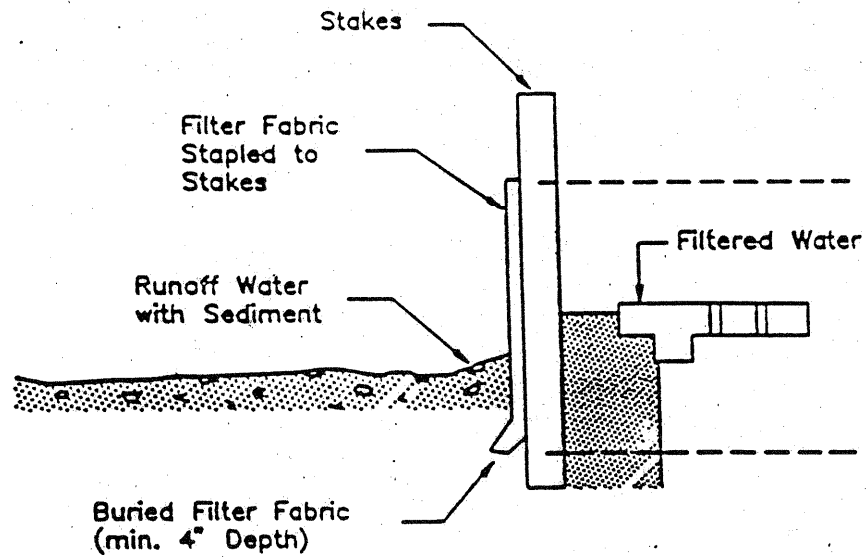
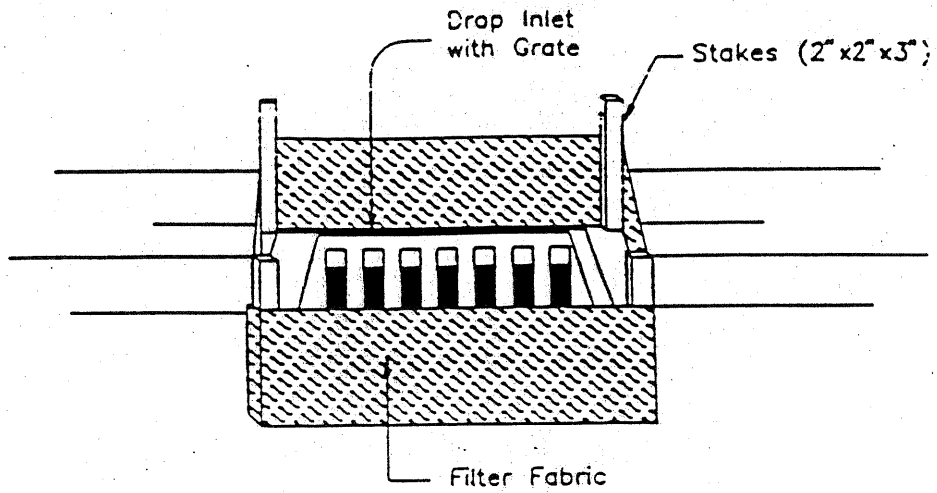
To prevent sediment from entering storm drain systems prior to permanent stabilization of disturbed areas.

#### Conditions Where Practice Applies

- Where interior site storm drain inlets are operational before permanent stabilization of the disturbed drainage area, as approved by the City.
- Adjacent to and immediately downhill of utility type construction in existing paved areas with catch basin drainage.
- In public right of way areas for use during approved flushing operations.

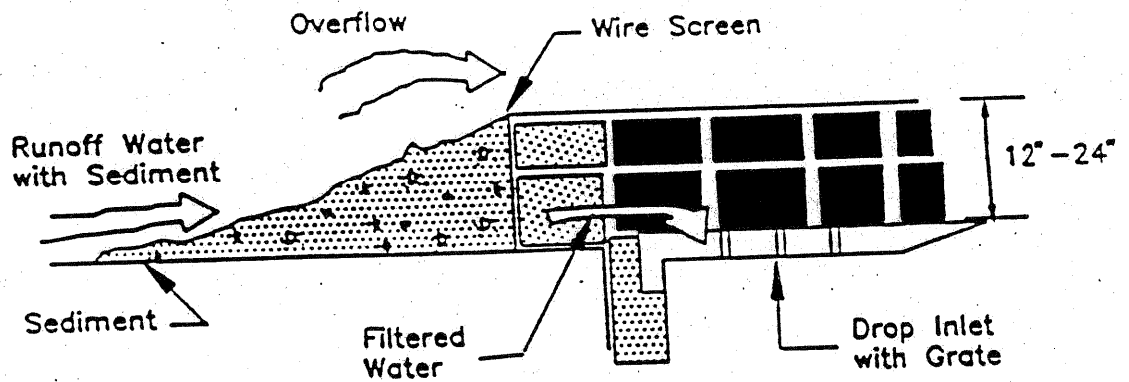
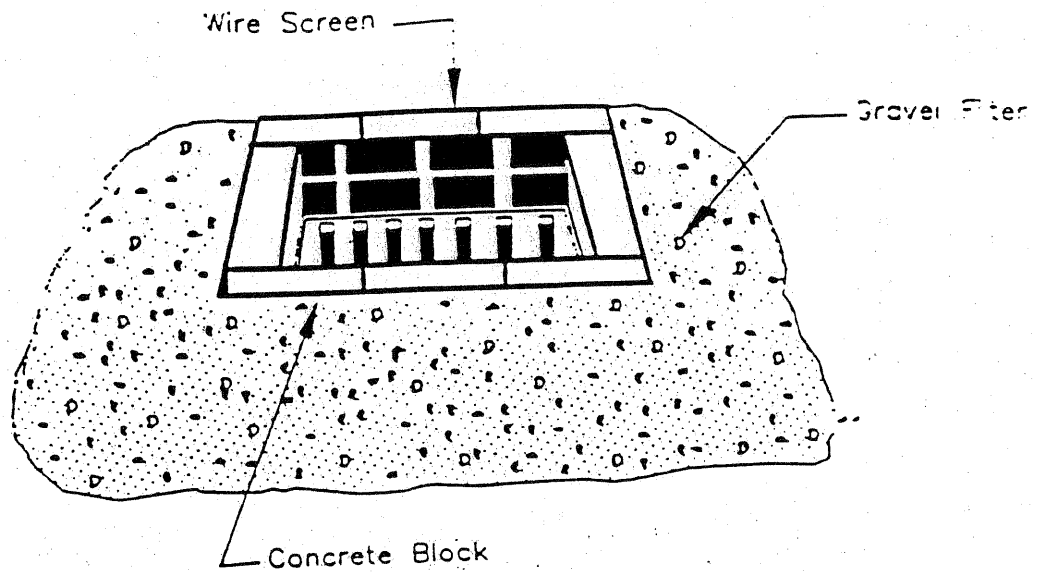
#### Design Criteria/Specifications

- Design criteria and specifications for three recommended alternative methods of storm drain inlet protection are presented on Figures 3-7 A, B, C.
- Berms may be required to direct drainage to flow through the filters and prevent bypassing of the inlets.
- At no time shall more than a one foot depth of sediment be allowed to accumulate against storm drain inlet protection measures. Sediment must be removed and inlet protection measures restored as needed to maintain their sediment trapping and filtering capability.



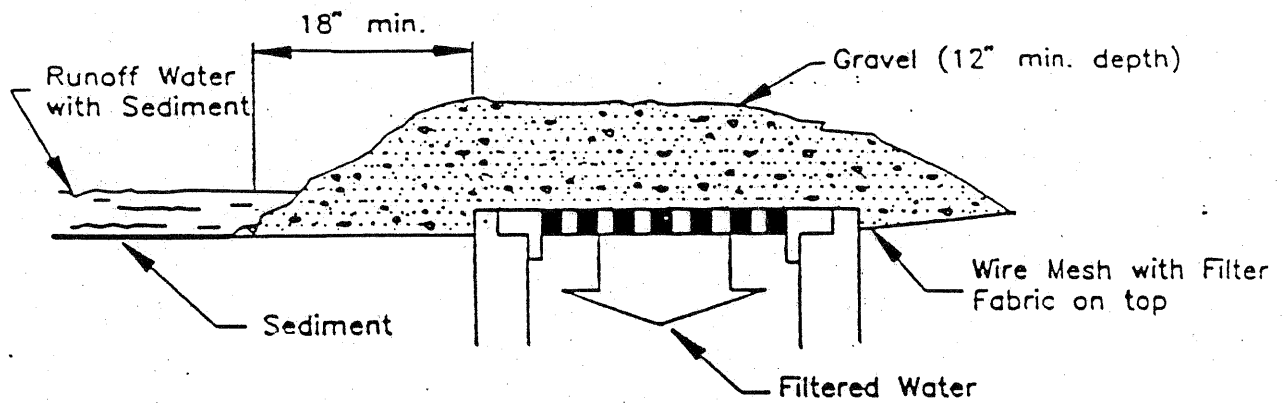
Drawn M.J.B.			PUBLIC WORKS DEPARTMENT CITY OF FAIRVIEW	Scale: N.S.
Engr.				Date:
Rev.	Date	Appr.	FILTER FABRIC INLET BARRIER	Appr:
				DWG No. 3-7A





Drawn M.J.B.			PUBLIC WORKS DEPARTMENT CITY OF FAIRVIEW	Scale: N.S.
Engr.				Date:
Rev.	Date	Appr.	BLOCK & GRAVEL INLET BARRIER	Appr:
				DWG No. 3-7B

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Engr.				Date:
Rev.	Date	Appr.	GRAVEL & WIRE MESH INLET BARRIER	Appr:
				DWG No. 3-7C

### 3.3.13 Check Dams

#### Purpose

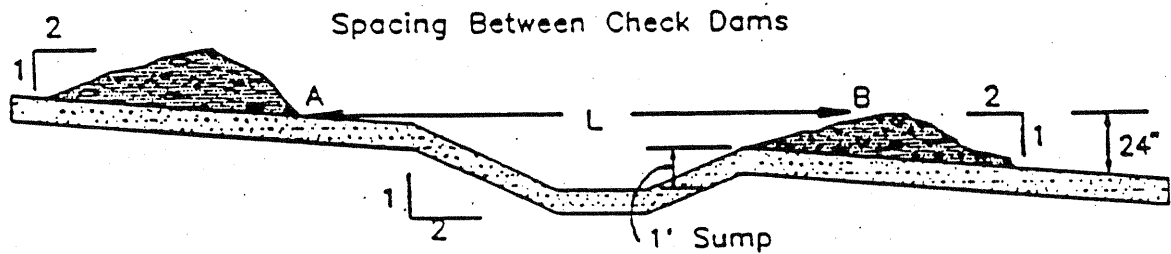
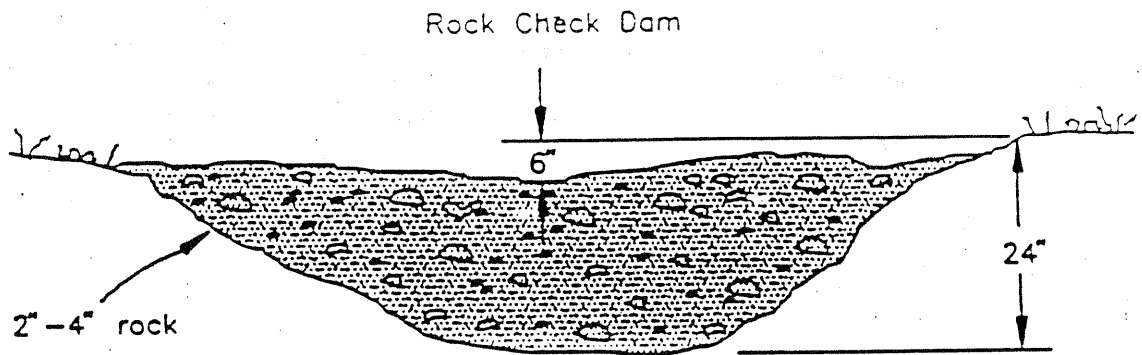
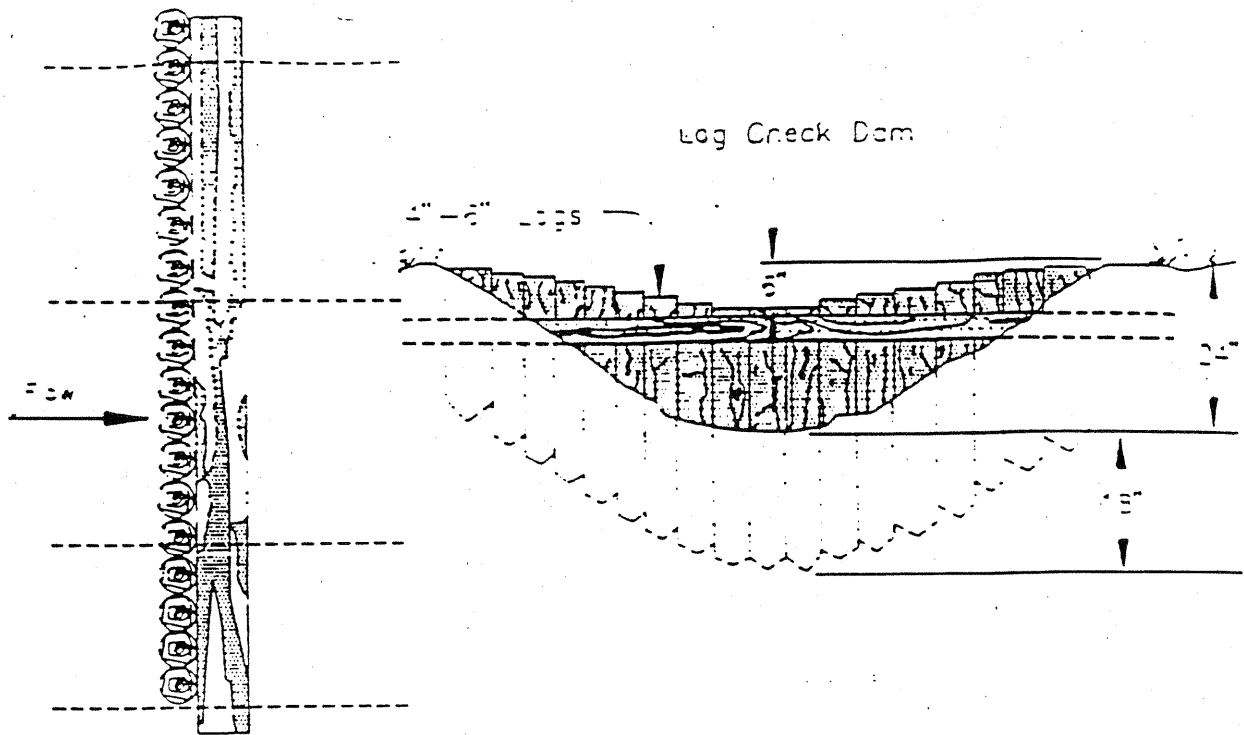
To reduce the velocity of concentrated flow, reducing erosion of the swale or ditch, and providing for sedimentation of suspended soil particles.

#### Conditions Where Practice Applies

- In new or disturbed ditches and swales to reduce velocities and erosion.
- In interior site ditches or swales conveying run-off from disturbed areas (other base and cove measures still required in addition to the check dams for disturbed drainage areas).
- No-check dams may be placed in streams, without prior approval by the City and state agencies as required.

#### Design Criteria/Specifications

- See Figure 3-8 for details.
- Check dams shall be constructed of either rock or logs. Check dams may also be constructed of straw bales or other materials as approved. (See Section 3.3.3 "Straw Bale Sediment Barrier" for approved uses and design criteria for straw bales).
- Construct a 1-foot deep sump immediately upstream of check dams for storage of settled sediment.
- Check dams shall be spaced such that the toe of the upstream dam is at the same elevation as the top of the next downstream dam.
- Rock check dams shall be constructed of rock spalls, 4" - minus. The rock must be placed by hand or mechanical placement (no dumping of rock to form dam) to achieve complete coverage of the ditch or swale and to ensure that the center of the dam is lower than the edges.
- Log check dams shall be constructed of 4- to 6-inch diameter logs. The logs shall be embedded into the soil at least 18 inches.
- Check dams shall be checked for sediment accumulation after each significant rainfall. Sediment shall be removed before filling sump.



L = The distance such that points A and B are of equal elevation

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Engr.				Date:
Rev.	Date	Appr.	CHECK DAMS	Appr:
				DWG No. 3-8

#### 4.0 INSPECTIONS AND ENFORCEMENT

- 4.1 In addition to the provisions hereinabove set forth concerning the submission of an erosion control plan by concerned parties and the approval thereof, the City will inspect the initial installation of the measures set forth in said control plan to determine if they are consistent with the tenor and terms of this Ordinance. If such is not the case—that is, if the primary measures outlined herein are not adequate to prevent the transportation of soil erosion from the site as hereinabove set forth, then additional measures may be required by the City to meet the purpose and intent herein set forth. The City will, during the course of construction, periodically inspect to determine the effectiveness of the facilities provided by applicant. The City may require that the applicant repair or modify the facility to meet the intent of the standards set forth herein.
- 4.2 The primary City department concerned with the inspection and enforcement of this Ordinance and its requirements is the Public Works Department which shall be primarily responsible for the inspection of erosion control measures for all publicly and privately financed projects subject to this Ordinance. However, verification of the installation, maintenance and effectiveness of the measures herein required will be a City wide effort.
- 4.3 The City Public Works Department shall have prime responsibility to check construction projects such as a single family, multiple family, commercial and industrial construction to assure that the measures set forth and required herein to minimize soil and erosion problems are followed. These inspections will take place on the regularly scheduled inspections called for in standard construction practices.
- 4.4 City Inspectors may issue one warning for noncompliance with the approved erosion control plan or otherwise in violation of this Ordinance requirements. Where a correction for noncompliance or adherence to such standards and plan occur, three days from date of the noted violation shall be permitted for the correction thereof. Violations noted and not corrected within said period shall be considered continuing violations and subject the concerned contractor or other party to the penalty provisions hereinafter set forth unless a written extension of compliance time is secured from the City Public Works Department.
- 4.5 The City Inspector, in the event that an inspection reveals a soil erosion condition occurring or likely to occur which may cause substantial damage to the project, adjoining properties or waterways or otherwise adversely affect the public's interest, may limit the period of time for such correction or repair to a period less than the normal three day period (72 hours) and may, in the inspector's discretion, in the event of a reasonable possibility of an irreparable damage situation occurring, issue an immediate stop work order concerning the project or that portion related to or affecting the soil erosion control problem as hereinabove set forth.

#### 5.0 PENALTIES

- 5.1 Violation of this Ordinance shall be punished upon conviction by a fine of not more than \$300. Each day such violation continues shall be considered a separate offense.
- 5.2 The failure or omission to comply with any section of this Ordinance shall be deemed a violation and may be so prosecuted, subject to the penalty provided in 5.1 of this section.

#### 6.0 SAVINGS CLAUSE

- 6.1 If any article, section, subsection, phrase, clause, sentence or word in this Ordinance shall for any reason be held invalid or unconstitutional by a court of competent jurisdiction, it shall not nullify the remainder of this Ordinance, but shall be confined to the article, section, subsection, subdivision, clause, sentence or word so held invalid or unconstitutional.

READ IN FULL AND BY TITLE, this 20<sup>th</sup> day of Jan, 1993.

READ A SECOND TIME BY TITLE ONLY, this 20<sup>th</sup> day of Jan, 1993, by the unanimous consent of all members of the Council present, there being present a quorum.

PASSED, this 20<sup>th</sup> day of Jan, 1993, BY THE COUNCIL OF THE CITY OF FAIRVIEW, OREGON, there being present a quorum.

YEAS: 5

NAYS: 0

Fred M. Carlson

Mayor, City of Fairview  
Fred M. Carlson

1-20-93

Date of Signing

ATTEST:

Nancy DiDonato

Recorder, City of Fairview  
Nancy DiDonato

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APPENDIX A

o REFERENCES

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## REFERENCES

Aldrich, Bob; Kramer, Chin & Mayo, Inc., Seattle, Washington, Personal Communication.

Hopkins, Keith, Hobbs and Hopkins, Ltd., Portland, Oregon, Personal Communication.

King County, Washington, Surface Water Management Division, Department of Public Works. January, 1990. "Surface Water Design Manual".

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Oregon Department of Transportation, State Highway Division. 1984. "Standard Specifications for Highway Construction".

Oregon Department of Transportation, State Highway Division, "Hydraulics Manual".

U.S. Department of Agriculture, Science and Education Administration. December, 1978. Predicting Rainfall Erosion Losses, A Guide to Conservation Planning. Agriculture Handbook No. 537.

USDA Soil Conservation Service. August, 1983. "Soil Survey of Multnomah County Oregon".

Faha, P.E., Lori; City of Portland, Bureau of Environmental Services and Raetz, P.E., Rick; Washington County, Department of Land Use and Transportation. November, 1989. Revised April 1990, January, 1991. "City of Portland, Erosion Control Plans, Technical Guidance Handbook".



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**APPENDIX B**

**o SAMPLE APPLICANT EROSION CONTROL  
INFORMATION FORM**

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CITY OF FAIRVIEW

GRADING/EROSION CONTROL INFORMATION

GENERAL CONTRACTOR NAME & ADDRESS:

\_\_\_\_\_

EXCAVATION CONTRACTOR  
NAME & ADDRESS:

\_\_\_\_\_

TELEPHONE NUMBERS:

APPLICANT: \_\_\_\_\_

OWNER: \_\_\_\_\_

GENERAL CONTRACTOR: \_\_\_\_\_

EXCAVATION CONTRACTOR: \_\_\_\_\_

SITE/JOB: \_\_\_\_\_

24 HR/AFTER HOURS EMERGENCY

CONTACT PERSON, TITLE, TELEPHONE:

\_\_\_\_\_

LOCATION & ADDRESS WHERE SPOILS

LEAVING SITE WILL BE TAKEN

(NOTE: PERMITS MAY BE REQUIRED)

\_\_\_\_\_

\_\_\_\_\_

CASEFILE NO.: \_\_\_\_\_

PERMIT NO.: \_\_\_\_\_

APPLICANT NAME AND ADDRESS:

\_\_\_\_\_

OWNER NAME AND ADDRESS:

\_\_\_\_\_

PROPERTY DESCRIPTION:

STREET ADDRESS AND CROSS STREET/LOCATED

\_\_\_\_\_

LEGAL DESCRIPTION:

TAX LOT NO.: \_\_\_\_\_

1/4 SECTION: \_\_\_\_\_

SITE SIZE, ACRES: \_\_\_\_\_

DISTURBED/WORK AREA, ACRES: \_\_\_\_\_

SITE RUNOFF DRAINS TO (CIRCLE ONE)

CATCH-BASIN

DITCH

PIPE

CREEK

(CIRCLE ONE)

PRIVATE PROPERTY

PUBLIC RIGHT-OF-WAY

EROSION/SEDIMENTATION CONTROL (ESC) MEASURES

MINIMUM ESC REQUIREMENTS  
DURING CONSTRUCTION:

SEDIMENTATION FACILITIES

STABILIZED CONSTRUCTION ENTRANCE

PERIMETER RUNOFF CONTROL

CLEARING AND GRADING RESTRICTIONS

COVER PRACTICES

CONSTRUCTION SEQUENCE

OTHER \_\_\_\_\_

MINIMUM ESC REQUIREMENTS  
FOLLOWING CONSTRUCTION:

STABILIZE EXPOSED SURFACE

REMOVE AND RESTORE TEMPORARY ESC

FACILITIES

CLEAN AND REMOVE ALL SILT AND DEBRIS

ENSURE OPERATION OF PERMANENT FACILITIES

OTHER \_\_\_\_\_

PLAN FOR EROSION CONTROL PREPARED AND SUBMITTED IN ACCORDANCE WITH "TECHNICAL GUIDANCE HANDBOOK". EROSION CONTROL PLAN DRAWING, AS REQUIRED, HAS PLAN CONSTRUCTION NOTES COMPLETE, INCLUDING EMERGENCY PHONE NUMBER, SCHEDULE/STAGING FOR INSTALLATION AND REMOVAL OF EROSION CONTROL MEASURES, AND APPLICABLE STANDARD NOTES.

I HAVE READ AND WILL COMPLY WITH THE ABOVE AND WILL CONSTRUCT AND MAINTAIN ESC MEASURES AS NECESSARY TO CONTAIN SEDIMENT ON THE CONSTRUCTION SITE.

OWNER SIGNATURE

APPLICANT SIGNATURE

OFFICIAL USE ONLY

FEE \_\_\_\_\_ RECEIPT  
NUMBER \_\_\_\_\_

DATE  
RECEIVED \_\_\_\_\_

ACCEPTED  
BY \_\_\_\_\_

---

**APPENDIX C**

**o UNIVERSAL SOIL LOSS EQUATION**

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## SCS Universal Soil Loss Equation

Erosion control measures utilized for any construction site must be designed to achieve a disturbed area erosion loss of no more than 1 ton per acre per year, based on the Soil Conservation Service (SCS) Universal Soil Loss Equation. The erosion control measures outlined in the matrices in Section 3.2 are designed to achieve the 1 ton per acre year goal, based on a typical soil type for the Fairview and East Multnomah County area. If, based on particular site conditions, different types or combinations of erosion control measures are desired for a construction site, the SCS Universal Soil Loss Equation or other approved supporting methodology/information must be used to design the erosion control system, and the design calculations must be submitted to the appropriate jurisdiction's permit review section with the proposed erosion control plan.

A brief summary of the use of the Universal Soil Loss Equation follows. For more detailed information, Agriculture Handbook No. 537, "Predicting Rainfall Erosion Losses, A Guide to Conservation Planning" (USDA, 12/78) is recommended.

The Universal Soil Loss Equation is:

$$A = R \cdot K \cdot LS \cdot CV \cdot PR$$

where:

A is the computed soil loss per unit area, generally in tons per acres per year.

R is the rainfall and run-off factor (R factors for the Fairview and East Multnomah County area can be found in Table 1, for factors for other areas, contact the local SCS office).

K is the soil erodibility factor and can be found in County SCS Soil Survey manuals, in the table of Physical and Chemical Properties of Soils (K values for Fairview and East Multnomah County area are presented in Tables 5 and 6).

LS is the slope-length factor. LS can be determined for a site using the known slope length and percent slope of a site and Table 2.

CV is the cover and management factor. Use 1.0 for a condition of no ground cover during construction. Other CV factors are presented in Tables 3 and 4.

PR is the erosion control practice factor. Use 1.0 for a condition of bare slopes. Use 0.9 to represent a condition of trackwalking up and down slopes.

To use the equation to determine the necessary measures to reduce the soil loss to 1 ton per acre per year, first determine the loss expected from a cleared site without erosion control measures (only calculate erosion losses for cleared and disturbed areas). Then various factors can be manipulated to represent different types and combinations of added erosion control measures and soil losses recalculated until the desired result is achieved.

Factors of the equation can be adjusted as follows to represent erosion control measures.

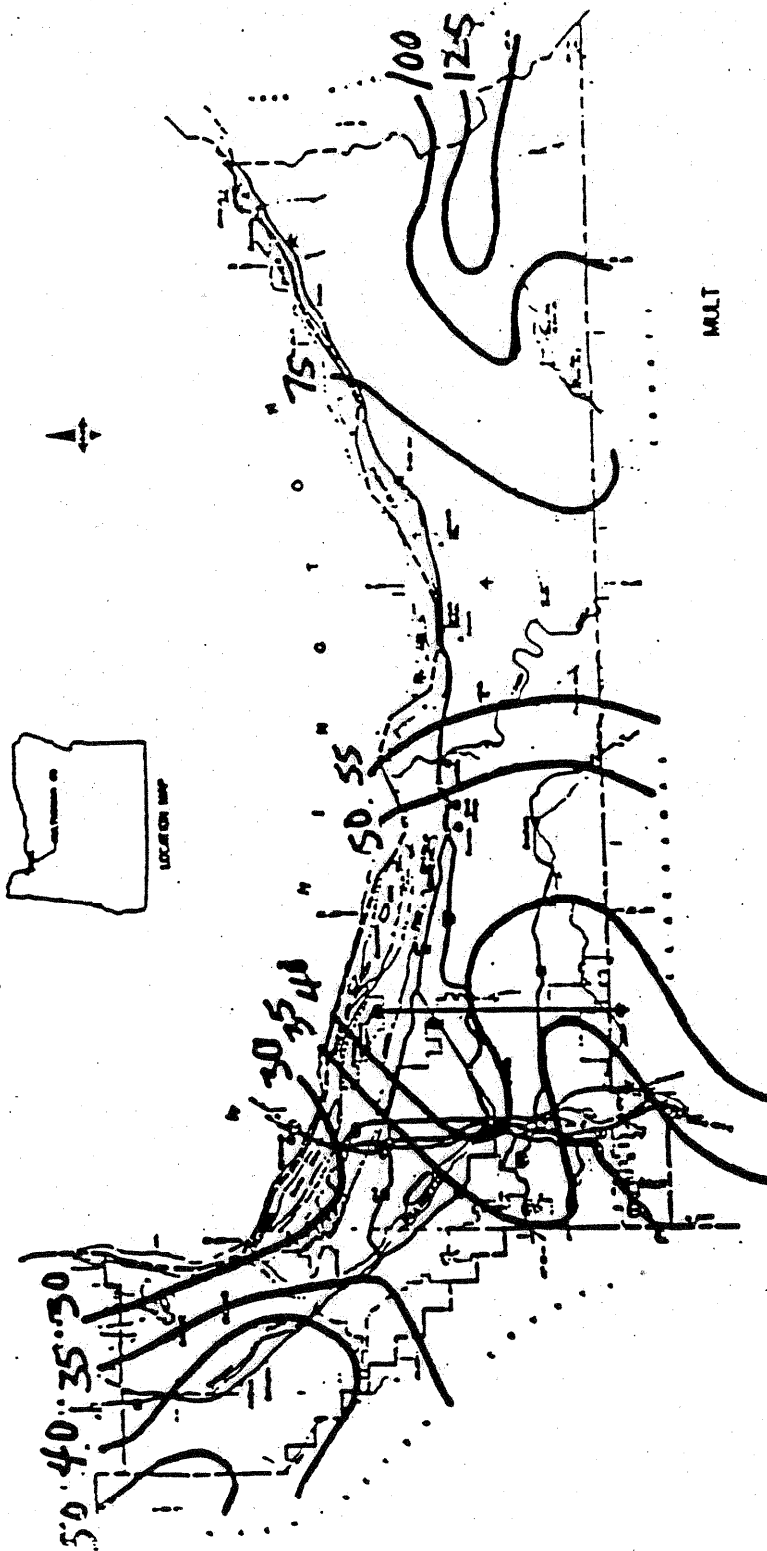
LS can be reduced by reducing slope lengths. This can be achieved by intercepting and re-routing flows uphill of the disturbed area and thus removing their erosive potential entirely from the site, or by adding interceptor dikes or swales in the disturbed area to direct flows from all or part of the area to a sediment trap or pond.

CX can be reduced by using cover practices such as seeding and mulching, erosion control blankets, or plastic sheeting.

PE can be reduced by such measures as grooving or stairstepping steep slopes.

(Note: design criteria for the erosion control methods noted above are given in Section 3.3)

THE BEST MEANS OF REDUCING TOTAL TONNAGE OF EROSION FROM A SITE AS WELL AS REDUCING THE AMOUNT OF EROSION CONTROL MEASURES REQUIRED IS TO MINIMIZE THE GROUND AREA THAT IS CLEARED AND DISTURBED AT ANY GIVEN TIME.



*Approved 4-15-86  
M. L. L. L.*

"R" FACTORS 11-83

Based on 2 years, 6 hour  
rainfall intensity map.

TABLE 2    o    LS VALUES FOR 'R' ZONE 2

WILLAMETTE VALLEY, OREGON

NOTE: 1. 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 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827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 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1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 1352, 1353, 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1686, 1687, 1688, 1689, 1690, 1691, 1692, 1693, 1694, 1695, 1696, 1697, 1698, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1711, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1731, 1732, 1733, 1734, 1735, 1736, 1737, 1738, 1739, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1747, 1748, 1749, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1759, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1777, 1778, 1779, 1780, 1781, 1782, 1783, 1784, 1785, 1786, 1787, 1788, 1789, 1790, 1791, 1792, 1793, 1794, 1795, 1796, 1797, 1798, 1799, 1800, 1801, 1802, 1803, 1804, 1805, 1806, 1807, 1808, 1809, 1810, 1811, 1812, 1813, 1814, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1822, 1823, 1824, 1825, 1826, 1827, 1828, 1829, 1830, 1831, 1832, 1833, 1834, 1835, 1836, 1837, 1838, 1839, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 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2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 22

13 value right of the vertical line will normally be used in calculating complex slopes.

Vertical lines indicate normal limits of simple slopes.

TABLE 3 o 'CV' VALUES MULCH FACTORS

Type of mulch	Mulch Rate	Land Slope	Factor CV	Length Limit <sup>2</sup>
	Tons per acre	Percent		Feet
None	0	all	1.0	---
Straw or hay,	1.0	1-5	.20	200
tied down by	1.0	6-10	.20	100
anchoring and				
tacking <sup>3</sup>	1.5	1-5	.12	300
equipment	1.5	6-10	.12	150
Do.	2.0	1-5	.06	400
	2.0	6-10	.06	200
	2.0	11-15	.07	150
	2.0	16-10	.11	100
	2.0	21-25	.14	75
	2.0	26-33	.17	50
	2.0	34-50	.20	35
Crushed stone,	135	< 16	.05	200
1/4 to 1 1/2 in	135	16-20	.05	150
	135	21-33	.05	100
	135	34-50	.05	75
Do.	240	< 21	.02	300
	240	21-33	.02	200
	240	34-50	.02	150
Wood chips	7	< 16	.08	75
	7	16-20	.08	50
Do.	12	< 16	.05	150
	12	16-20	.05	100
	12	21-33	.05	75
Do.	25	< 16	.02	200
	25	16-20	.02	150
	25	21-33	.02	100
	25	34-50	.02	75

<sup>1</sup>From Meyer and Ports (24). Developed by an interagency workshop group on the basis of field experience and limited research data.

<sup>2</sup>Maximum slope length for which the specified mulch rate is considered effective. When this limit is exceeded, either a higher application rate or mechanical shortening of the effective slope length is required.

<sup>3</sup>When the straw or hay mulch is not anchored to the soil, CV values on moderate or steep slopes of soils having K values greater than 0.30 should be taken at double the values given in this table.



TABLE 4 o

"CV" FACTORS (OREGON)  
CONSTRUCTION SITES

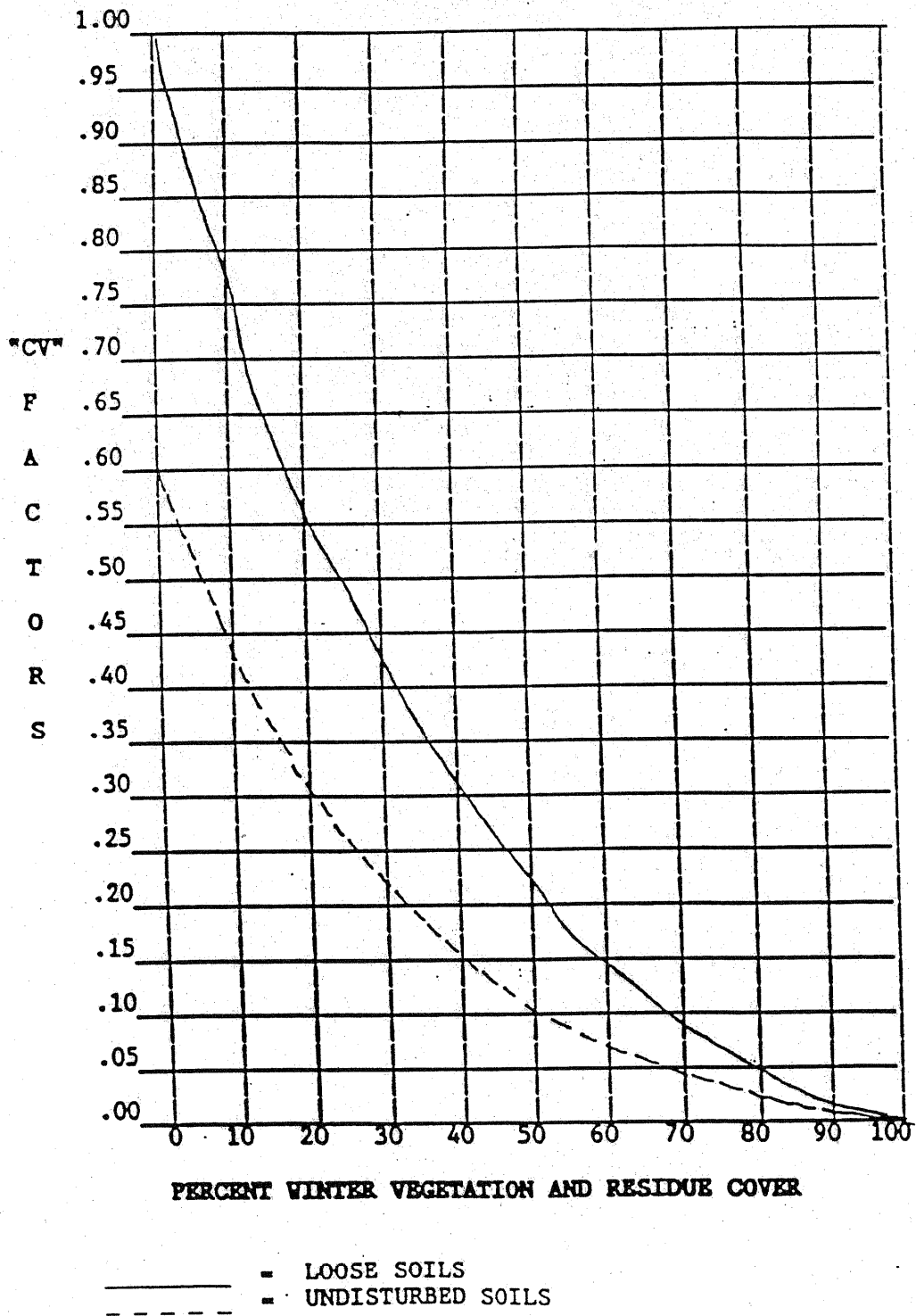


TABLE 5 o HYDROLOGIC SOIL GROUPS & 'K' FACTORS Fairview/EAST MULT. COUNTY

MAP SYMBOL ERODIBILITY SYMBOL	SOIL GROUP GROUP	HYDROLOGIC SYMBOL SYMBOL	SOIL FACTOR "K"
1A & B & 2A	Aloha	C	.55
7B, C & D	Cascade	C	.28
10B, 11B	Cornelius	C	.49
14C	Delena	D	.43
15 & 16	Faloma	B/D	.37
20F	Haplumbrepts	C	.43
25B, C & D, 2GA & B, 51C	Latourell	B	.43
29A & B, 30A & B, 52A	Multnomah	B	.28
31	Pilchuck	A	.10
34B, C & D, 35A	Powell	C	.37
36A & B	Quafeno	C	.43
37B, C & D, 38A, 54B	Quatama	C	.37
39, 40	Rafton	C/D	.49
41	Rivervash	N/A	N/A
44, 45 & 46	Sauvie	C/D	.32
55	Wapato	D	.32
57	Wollent	D	.55

\*Soils listed are those present in portion of East Multnomah County and the City of Fairview.

Note: "K" Values above are the worst case for top or subsoil values from SCS Soil Survey.

#### Hydrologic Soil Group Classifications

- A. (Low runoff potential.) Soils having high infiltration rates, even when thoroughly wetted, and consisting chiefly of deep, well-to-excessively drained sands or gravels. These soils have a high rate of water transmission.

- B. (Moderately low runoff potential). Soils having moderate infiltration rates when thoroughly wetted, and consisting chiefly of moderately fine to fine textures. These soils have a slow rate of water transmission.
- C. (Moderately high runoff potential). Soils having slow infiltration rates when thoroughly wetted, and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine textures. These soils have a slow rate of water transmission.
- D. (High runoff potential). Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a hardpan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

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**APPENDIX D**

**o RECOMMENDED STANDARDS NOTES FOR  
EROSION CONTROL PLANS**

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## RECOMMENDED STANDARD NOTES FOR EROSION CONTROL PLANS

- Approval of this erosion/sedimentation control (ESC) plan does not constitute an approval of permanent road or drainage design (e.g. size and location of roads, pipes, restrictors, channels, retention facilities, utilities, etc).
- The implementation of these ESC plans and the construction, maintenance, replacement, and upgrading of these ESC facilities is the responsibility of the applicant/contractor until all construction is completed and approved and vegetation/landscaping is established.
- The boundaries of the clearing limits shown on this plan shall be clearly flagged in the field prior to construction. During the construction period, no disturbance beyond the flagged clearing limits shall be permitted. The flagging shall be maintained by the applicant/contractor for the duration of construction.
- The ESC facilities shown on this plan must be constructed in conjunction with all clearing and grading activities, and in such a manner as to insure that sediment and sediment laden water do not enter the drainage system, roadways, or violate applicable water standards.
- The ESC facilities shown on this plan are the minimum requirements for anticipated site conditions. During the construction period, these ESC facilities shall be upgraded as needed for unexpected storm events and to ensure that sediment and sediment-laden water do not leave the site.
- The ESC facilities shall be inspected daily by the applicant/contractor and maintained as necessary to ensure their continued functioning.
- The ESC facilities on inactive sites shall be inspected and maintained a minimum of once a month or within 48 hours following a storm event.
- At no time shall more than one foot of sediment be allowed to accumulate within a trapped catch basin. All catch basins and conveyance lines shall be cleaned prior to paving. The cleaning operation shall not flush sediment laden water into the downstream system.
- Stabilized construction entrances shall be installed at the beginning of construction and maintained for the duration of the project. Additional measures may be required to insure that all paved areas are kept clean for the duration of the project.

#### Standard Notes for Sediment Fences:

- The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid use of joints. When joints are necessary, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and both ends securely fastened to the post.
- The filter fabric fence shall be installed to follow the contours where feasible. The fence posts shall be spaced a maximum of 8 feet apart and driven securely into the ground a minimum of 24 inches.
- When standard strength filter fabric is used, a wire support fence shall be fastened securely to the upslope side of the posts using heavy-duty wire staples at least 1-inch long, tie wire, or hog rings. The wire shall extend into the trench a minimum of 4 inches and shall not extend more than 36 inches above the original ground surface.
- The standard strength filter fabric shall be stapled or wired to the fence, and 12 inches of fabric shall be extended into the trench. The fabric shall not extend more than 36 inches above the original ground surface. Filter fabric shall not be stapled to existing trees.
- When extra-strength filter fabric and closer post spacing are used, the wire mesh support fence may be eliminated. In such a case, the filter fabric is stapled or wired directly to the posts with all other provision of the above standard note for standard strength filter fabric applying.
- Sediment fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently established.
- Sediment fences shall be inspected by applicant/contractor immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.
- Construction schedule